MOORED CURRENT METER AND CTD OBSERVATIONS FROM BARROW STRAIT 2004-2005

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Abstract

Pettipas, R., J. Hamilton, and S. Prinsenberg. 2008. Moored current meter and CTD observations from Barrow Strait, 2004-2005. Can. Data Rep. Hydrogr. Ocean Sci. 174 : vii + 135 p.

Ten instrumented moorings deployed in the eastern end of Barrow Strait from August 2004 to August 2005 provide yearlong records of current, temperature, salinity, bottom pressure and ice drift, extending a data time series started in August of 1998. Current data presented have been collected with acoustic Doppler current profilers and specialised instrumentation for near-pole direction measurement. Temperature, salinity and density for fixed depths from moored CTDs are also presented. The current and CTD data are presented as filtered and unfiltered time series, spectral and tidal analyses products, and statistical summaries. Three weeks of near-surface temperature, salinity and fluorescence collected by the moored profiler, Icycler before it malfunctioned and was dragged off station, are also shown.

Finally, two CTD sections across Barrow Strait and one across Wellington Channel, based on a 2005 ship-based survey, are presented.

Résumé

Pettipas, R., J. Hamilton, and S. Prinsenberg. 2008. Moored current meter and CTD observations from Barrow Strait, 2004-2005. Can. Data Rep. Hydrogr. Ocean Sci. 174 : vii + 135 p.

Dix batteries d'instruments ancrées dans l'embouchure est du détroit de Barrows d'août 2004 à août 2005 ont fourni sur l'année des mesures des courants, de la température, de la salinité, de la pression au fond, de la dérive et de l'épaisseur de la glace, qui viennent prolonger une série chronologique de données commencée en août 1998. Les données sur les courants qui sont présentées ont été recueillies au moyen de profileurs de courant à effet Doppler et d'instruments spécialisés pour la mesure des directions près du pôle. Sont également présentées des données sur la température, la salinité et la densité à des profondeurs fixes mesurées avec des sondes CTP ancrées. Les données sur les courants et les données des sondes CTP sont présentées sous forme de

séries chronologiques lissées et brutes, de produits issus d'analyses des marées et d'analyses spectrales, et de résumés statistiques. S'ajoutent aux données précitées trois semaines de données sur la température près de la surface, sur la salinité et sur la fluorescence recueillies par le profileur ancré Icycler avant qu'il tombe en panne et soit retiré de la station.

Enfin, trois coupes transversales d'enregistrements des sondes CTP, deux portant sur le détroit de Barrows et une sur le chenal Wellington, qui proviennent d'un relevé réalisé à partir d'un navire en 2005, sont aussi présentées.

Introduction

A field program to quantify and examine the inter-annual variability of the exchange through Barrow Strait (a principal pathway between the Arctic and North Atlantic Oceans), and more generally, to improve our understanding of the circulation within the Arctic Archipelago, was started by BIO investigators in August of 1998. Data from the first six years of this study, along with a description of the methods used, have previously been reported [Pettipas et al., 2006, 2005; Hamilton et al., 2008, 2004, 2003, 2002]. Described here are moored instrument data from the seventh year of the study.

Yearlong records of temperature, salinity and density information derived from moored microcat CTD data are presented as unfiltered and low-pass filtered time series, and also as power spectra. Current rate and direction are also presented as unfiltered and low-pass filtered contour plots, and as time series plots for depths corresponding to the moored CTDs. Seasonally averaged statistical summaries for both the CTD and current data are provided as graphs and/or in tabular form. Results of tidal analyses of the current data give tidal amplitudes, phase, and ellipse orientation as a function of depth for each of the five main tidal constituents (K1, M2, O1, S2, P1). Separate tidal analyses have been done for periods of solid ice cover and periods of open water.

Ice drift velocity, also obtained from the acoustic Doppler current profilers (ADCPs), are presented as yearlong time series. Ice draft measurements acquired with a moored ASL ice profiling sonar (IPS) in 2003-2004, were not repeated in 2004-2005 due to instrument problems prior to mooring deployment. Water level and bottom temperature from water level recorders (WLRs) in three locations are also presented.

Also presented are three weeks of data from the Icycler profiler, which was moored on the South side of the strait. Detailed daily 45 m profiles of salinity, temperature, fluorescence and density to within 2 m of the ice cover, are presented as contour plots for those three weeks. After this time, the Icycler was dragged off station by ice, and was not recovered until two years later, 20 km from the deployment location.

Finally, hydrographic sections at the eastern and western ends of Barrow Strait, and across Wellington Channel are presented. These cross-sectional diagrams are created

from a CTD survey conducted during the field study. These lines have been completed each summer since 1998, when ice conditions allowed.

Mooring Locations and Description

A total of ten instrumented moorings were distributed over four sites across the eastern end of Barrow Strait (see Figure 1) as in the previous three years. Four moorings were located at the 150 m contour on the south side, two moorings were halfway between this Southern site and the center of the strait (the "South Central" site), two moorings were in the middle of the Strait (the Central site), and two moorings were at the 200 m contour on the north side. An illustration of the moorings deployed is shown in Figure 2.

Acoustic Doppler Current Profilers (ADCPs) manufactured by RD Instruments (RDI), and precision heading references were mounted in streamlined buoyancy packages to provide current rate and direction information. The technique used to obtain reliable direction measurements here, where conventional compass technology is inadequate due to the proximity of the site to the magnetic pole, is described in detail by Hamilton [2004, 2001]. These upward looking ADCPs logged average speeds from 100 pings over a 5 minute on-period every 2 hours, and also provided a simultaneous ice drift speed over the yearlong deployment. 300 kHz Workhorse ADCPs were used at the Southern, Central and Northern sites. A "Long Ranger" (75 kHz) was used at the South-Central site. Concurrent direction measurements were logged separately with the precision heading reference systems, and have been merged with the ADCP speed data for presentation here. All five ADCP/compass systems were successfully recovered, and provided good quality data for the entire deployment period with two exceptions: The pole compass on the deep ADCP at the Southern site did not function properly, and the Long Ranger at the South-Central site did not provide ice drift data due to instrument setup issues.

SeaBird MicroCat CTDs were used to measure temperature, conductivity and pressure at targeted depths of 40, 80 and 160 m across the Strait, as well as the near-

bottom at the Southern and South-Central sites. These CTDs recorded a single temperature, conductivity and pressure every 30 minutes. The instrument at the 80 m level on the South side flooded, and returned no data. The 40 m level CTD on the North side was lost along with the top half of this mooring, presumably to ice. The other 12 microcat CTDs were recovered and returned good data.

Water level recorders were attached to anchors of moorings at the Southern, Central and Northern sites. An eleventh mooring to support a water level recorder was also deployed in the middle of the strait, 95 km to the west of the main mooring line. This was the second year that the water level recorders were used in the array. The three instruments along the main mooring line all returned good pressure data. Unfortunately, there was no response from the release on the mooring that supported the water level recorder to the west, and attempts to drag up this mooring were unsuccessful.

A new version of the profiler "Icycler" (Icycler60) was moored at the Southern site to obtain water property information in the upper water column, replacing the prototype used successfully at this location in 2003-2004. Icycler was developed at Bedford Institute of Oceanography, and is described in Fowler et al., 2004. Only three weeks of daily profiles of salinity, temperature and fluorescence from 45 m depth to just 2 m below the ice were collected in 2004-2005 before the Icycler malfunctioned, and was dragged off station.

A summary of the 2004-2005 moorings and instrumentation, including mooring positions, instrument depths and acquired data records, is presented in Table 1.

Data Processing

Current Speed and Direction Data

The Workhorse ADCPs were mounted in streamlined buoyancy packages (A2 "SUBs" manufactured by Open Seas Inc.) and set up to measure current relative to the instrument axes, ignoring their own compass information. These instruments were set up to average over a depth interval of 4 m. Typically, the highest useful depth average in the

data sets from the three upper ADCP instruments (moored at a depth of about 80 m) was centered around 10 m. Current data above this level were rejected based on RDI's standard echo intensity quality criterion. The Long Ranger ADCP was also set up to ignore its own compass, and averaged over an 8 m interval. These acoustic Doppler current profilers also record ice drift velocity when there is solid or near-solid ice cover.

Direction was provided using an independent compass package mounted in the buoyancy package tail to give the orientation of the ADCP relative to magnetic north. Initiation of a compass sample cycle was triggered by the commencement of the bihourly ADCP measurement by making use of RDI's "RDS3 interface" to provide a turn-on pulse to the compass. The "pole compass" was programmed to take a 10 s sample in the middle of the 5 minute ADCP sampling interval. This conserved compass battery power, and took advantage of previous experience that current direction does not change significantly over 5 minutes at the study location [Hamilton et al., 2003].

Direction records were then adjusted for the variation in magnetic declination using magnetic observatory data from the NRCAN observatory in Resolute to get direction relative to true north.

At the Southern site, two Workhorse ADCPs, one at 76 m and one at 143 m depth, combine to provide currents for most of the water column. However a problem with the pole compass on the deeper unit meant that those direction data had to be rejected. To ascribe a direction to the current speeds from this system, current direction for the shallowest bin is taken from the corresponding bin of the nearby ADCP/pole compass moored at 76 m, or the nearest bin for which there is reliable data. Even if this nearest reliable bin is as much as 20 m shallower, current shear through the middle part of the water column is low, so any errors introduced will be small. See Hamilton et al., 2002 for a thorough analysis of this direction substitution.

At the South-Central site where the bottom depth is ~250 m, the Long Ranger moored near bottom provides coverage for pretty well the entire water column with a single instrument. At the Central and Northern sites, currents for the upper water column only are provided by the Workhorse ADCPs moored at about 80 m depth.

Vertical excursions of the ADCPs caused by current drag forces acting on the mooring were similar to previous years, rarely exceeding 3 m.

Moored CTD Data

SeaBird MicroCat CTDs were set up to measure temperature, conductivity and pressure every 30 minutes for the yearlong deployments. The mooring supporting the 40 m level CTD at the South-Central site was subjected to the greatest dip due to current drag forces acting on the mooring. The largest observed dip was 12 m, with a standard deviation in instrument depth over the yearlong deployment of just 0.9 m.

Low-Pass Filtering

Some of the data series presented have been filtered to remove the semidiurnal and diurnal tides using the technique described by Godin [1972]. The technique uses three simple averaging filters applied in sequence. Godin, working with hourly observations, recommends two consecutive applications of a filter that averages over 24 samples, followed by one that averages over 25 samples. Here for the bi-hourly current data, we sequentially apply 12,12, and 13 sample averaging filters, while for the semi-hourly MicroCat CTD data we sequentially apply 48, 48 and 50 sample averaging filters.

Tidal Analysis

Harmonic tidal analyses of current data using Foreman's [1978] method is presented separately for a period of solid ice cover (20 weeks), and a period of broken or no ice (7 ½ weeks). In the two previous years (2002-2004), ice was far more mobile through the winters, limiting or preventing tidal analysis for the solid ice case. Ice conditions for this year (2004-2005) are similar to those seen in the earlier years of the study (1998-2002), when ice was land fast for at least four months each winter at all ADCP stations. Tidal ellipse axes amplitudes, orientations and phases for the main tidal constituents (K1, M2, O1, P1 and S2) are plotted as a function of depth.

The periodic vector function describing a particular constituent, traces an ellipse over a tidal cycle with major and minor amplitudes defined by the length of the semi-

major and semi-minor axes. The major axis amplitude is always positive. The sign of the minor axis amplitude defines the rotation sense of the current ellipse. When positive the vector traces the ellipse in a counter-clockwise direction; when negative, the rotation sense is clockwise.

Ellipse orientation is the angle measured counter-clockwise from east to the semi-major axis.

The phase is a measure of the timing of high water referenced to astronomic positions over the Greenwich meridian. Phase is measured counter-clockwise from this chosen reference.

Data Presentation

Yearlong time series of half-hourly sampled temperature, salinity and density from the moored CTDs are shown in Figures 3 - 6. At the Southern site, the distinct pulse of freshwater seen at the 40 m level in early fall the previous years is not as prominent. The freshwater pulse at the South-Central site though is stronger than in each of the 3 previous years.

Power spectra of the moored CTD measurements are shown in Figures 7-10. Results are similar to the previous year. Diurnal and weaker semi-diurnal signals are typically observed in the records, except at the Central site where the spectra show little in the way of distinguishing features.

Current data are shown as contour plots in Figures 11-18. Data from the deep and mid-water ADCPs at the Southern site have been combined. Data are presented in along-strait and cross-strait components, where positive values are defined as flow towards 105° true and 15° true, respectively. Figures 11-14 display a month of unsmoothed data in which a strong tidal signal is apparent. On the South side (Figure 11), strong eastward flow is typical through September, but there is also a 3 day period of strong westward flow towards the end of the month (also seen on the North side, Figure 14) suggesting the influence of meteorological forcing. Low-pass filtered data (tides removed) are shown in Figures 15-18. Mean flow is predominantly eastward at the

South, South-central and Central sites throughout the year. At the Central site mean flows were similar in 2002-2003, but near zero in 2003-2004. At the Northern site, flow direction is westward in late summer and fall, and then near zero or weakly eastward for the rest of the year, repeating the pattern of the previous 3 years.

Missing data near the surface through the winter and spring (Figures 15, 17) are caused by a decrease in the effective range of the ADCPs when the water is at its clearest, and contains a minimum of acoustic reflectors. (The manufacturer's suggested data quality acceptance criteria have been applied.) The smoothing method used has smeared the impact of missing raw data over the filter length.

Smoothed temperature, salinity and current data (where available) are shown for each moored CTD level in Figures 19-30. Tables 2 through 25 provide a summary of the CTD and ADCP data at the CTD depths, with statistics computed over each season, and for the entire year. Density has been included in these statistical summaries.

Annual and seasonal mean flows are summarised in Figures 31-36. Each 4 m binned value for the WorkHorse ADCPs (8 m for the Long Ranger ADCP) is shown. Seasonal current patterns are similar to the previous years, with one noticeable difference being fall currents on the South side being 1/3 of what they were in the previous 3 years. With slightly higher values there in winter and spring, the yearlong averages at all four sites are quite similar to previous years.

As in the previous three years there is significant seasonal variation, but flows are predominately easterly in the upper water column, becoming progressively weaker moving north to the South Central and Central sites, and low or westward on the North side. Currents at the Central and North sites are near zero throughout the year.

The variance in the bihourly, and low-pass filtered current data for the yearlong ADCP records are shown in Figure 37. On the south side, tides account for only half of the total variance in the along-strait current speeds, but at the Central site the portion due to tides is about 80%.

Tidal analysis results for the ADCP data collected at all 4 sites are presented as profiles for the 5 largest tidal constituents in figures 38 – 57. Separate analyses have been done for ice-free and solid ice periods. Higher near-bottom amplitudes in the K1 and O1 constituents (both diurnal components), is evident in the result of the Long

Ranger record analysis, deployed at the South Central site (Figure 43). A possible interpretation is the presence of bottom-trapped shelf waves. (Brian Petrie, pers. comm). Higher amplitudes are not seen near-bottom in the semi-diurnal constituents (M2, S2). This is consistent with the shelf waves explanation as they are not expected at frequencies above the local inertial frequency (1.9 cy/day). Ellipse orientations are generally along-strait as expected. Tidal constants are summarised in Tables 29 - 33.

Ice velocities through the year at the 4 sites were derived from the upper ADCPs, and are shown in Figures 58 - 61. No data were returned for the Long Ranger ADCP at the South-Central Site because of an instrument setup issue. Since the ice drift measurement quality is degraded by the presence of open water, there are periods in the time series at all three of the other sites where no data are presented. The manufacturer's suggested data quality standards have been applied to the ice drift data. An additional criterion applied here is that where the magnitude of the "error velocity" for a particular ensemble is greater than 1 cm/s, the ice drift velocity estimate and the adjacent estimates are rejected.

Ice was landfast right across the strait from early February through to the first of July, in contrast to the two previous years when ice was far more mobile throughout the winter. The early July break-up in 2005 is also later than was observed in 2003-2004 (June 1) or in 2002-2003 (mid-May) deployments, and more consistent with the first years of the study, when ice was landfast for months, and break-up was typically in mid to late July.

A station map for the August 2004 ship-based CTD survey is shown in Figure 62. Results for the three lines appear as contoured sections in Figures 63, 64 and 65. The Barrow Strait sections do not indicate as strong an eastward geostrophic flow along the southern half of the Strait as the August survey typically reveals. Ice on the western side of Wellington Channel prevented completion of Station 23.

Anchor-mounted water level recorders were deployed at the South, Central and North sites of the Barrow Strait mooring line (at approximately 91 °W). Time series plots of pressure and temperature from these instruments are shown for the in Figures 66, 67 and 68, with statistical summaries provided in Tables 26, 27 and 28. The pressure records from these three units will be used to compute the geostrophic current

across our mooring line. A fourth water level recorder was deployed on a separate mooring in the center of the strait 95 km to the west of the Eastern Barrow Strait mooring line, at 74° 23.6" N, 93 ° 49.7 " W. This instrument was not recovered due to a failed acoustic release, so an along-strait surface slope can not be computed to contribute to the interpretation of the geostrophic calculations obtained from the water level recorders along the main mooring line.

The Icycler profiler remained at its deployed position for only 18 days, after which it is believed a malfunction left the sensor float extended where it got caught in ice and dragged off station. This mooring was recovered two years after deployment. Deployment and recovery positions are shown in Figure 69. Records from the CTD on that mooring are shown in Figure 70. The pressure record indicates that the mooring moved in two separate events. The first shift occurred over a 2 hour period, while the second was over a 7.5 hour period. With the total distance travelled being 20.1 km, this gives an average travel speed of 60 cm/s, closely matching the ADCP-measured ice drift speed. This strongly supports the theory that the sensor float was caught in ice, probably twice, with the sensor float getting free after the initial shift August 22, only to be caught up in the ice again August 31.

Shown in Figure 71, are the salinity, temperature, fluorescence and density data from Icycler for the 3 weeks immediately after deployment. These include all the Icycler profile data obtained in 2004-2005. Fresher water in the upper 25 m is evident, and similar to that seen with Icycler in August of the previous year. (Hamilton et al., 2008). The fluorescence shows evidence of a bloom from 15-30 m depth in mid-August. Absolute values of fluorescence need to be viewed with caution, as no calibration with extracted chlorophyll measurements from concurrent water samples has been applied.

Acknowledgements

We thank Kate Collins and Kumiko Azetsu-Scott for their reviews of this report, and Lorne McKee (NRCAN) for providing the Resolute Observatory magnetic declination data.

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Figure 1. **A map of the work area showing the location of the mooring sites (the open boxes), and the hydrographic survey lines (the dashed lines).**

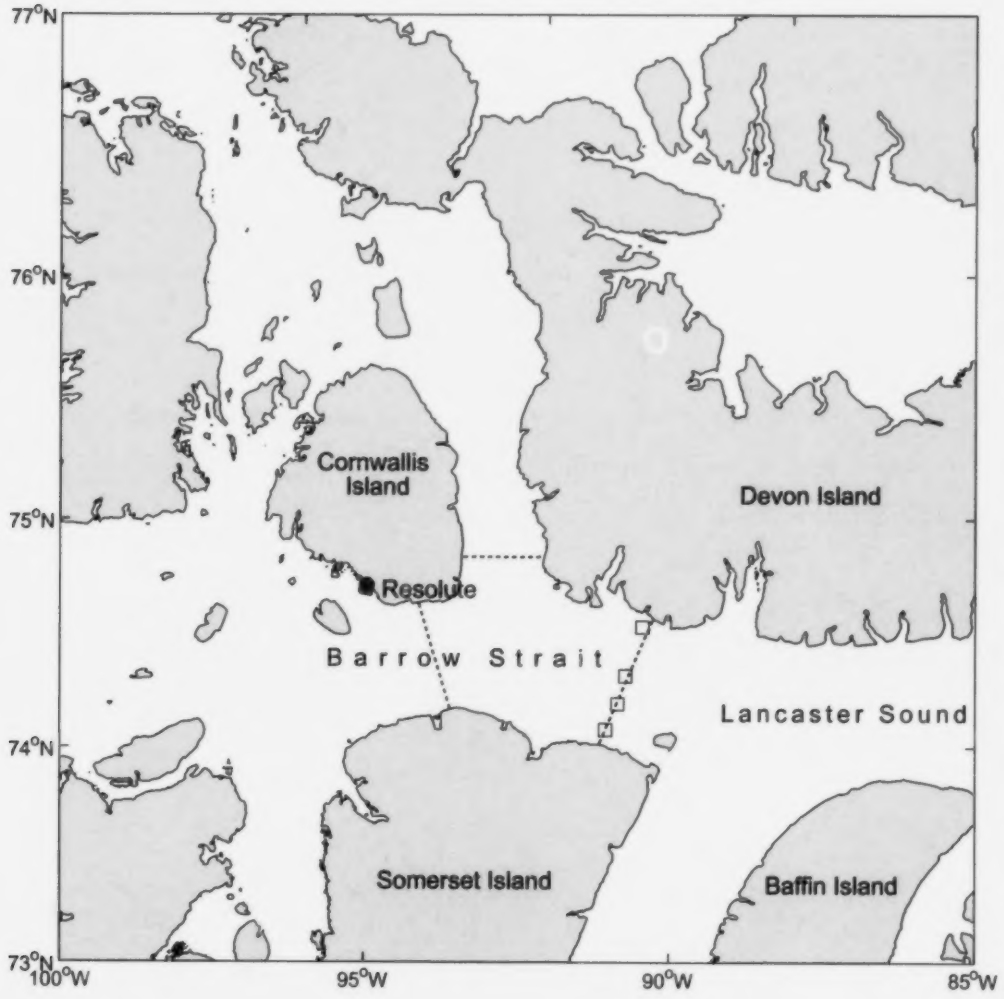


Figure 2. Illustration of the Instrumented Moorings

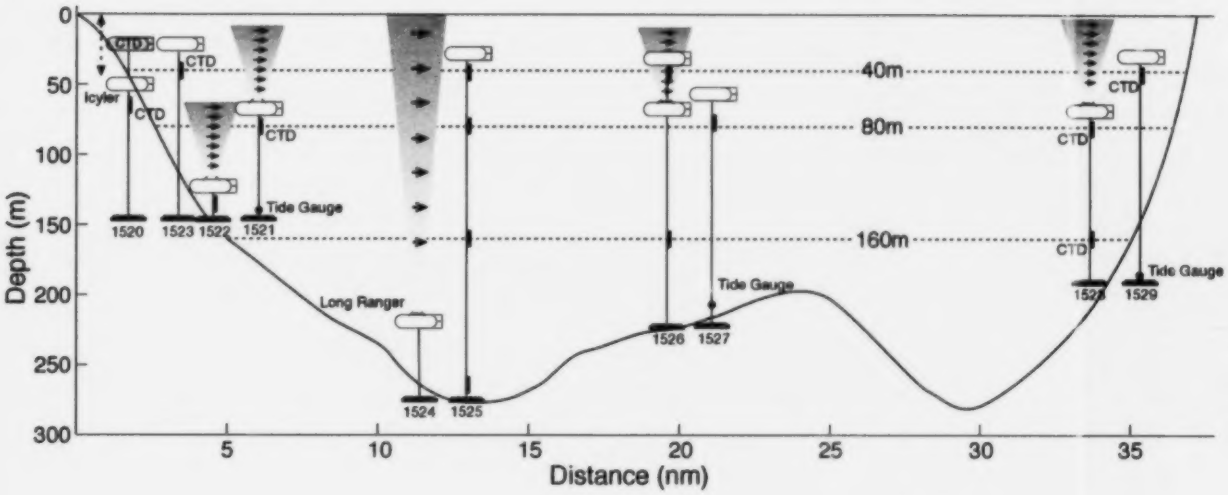


Figure 3 – Moored 30 min. CTD data, South Side Barrow Strait. August 2004 – August 2005

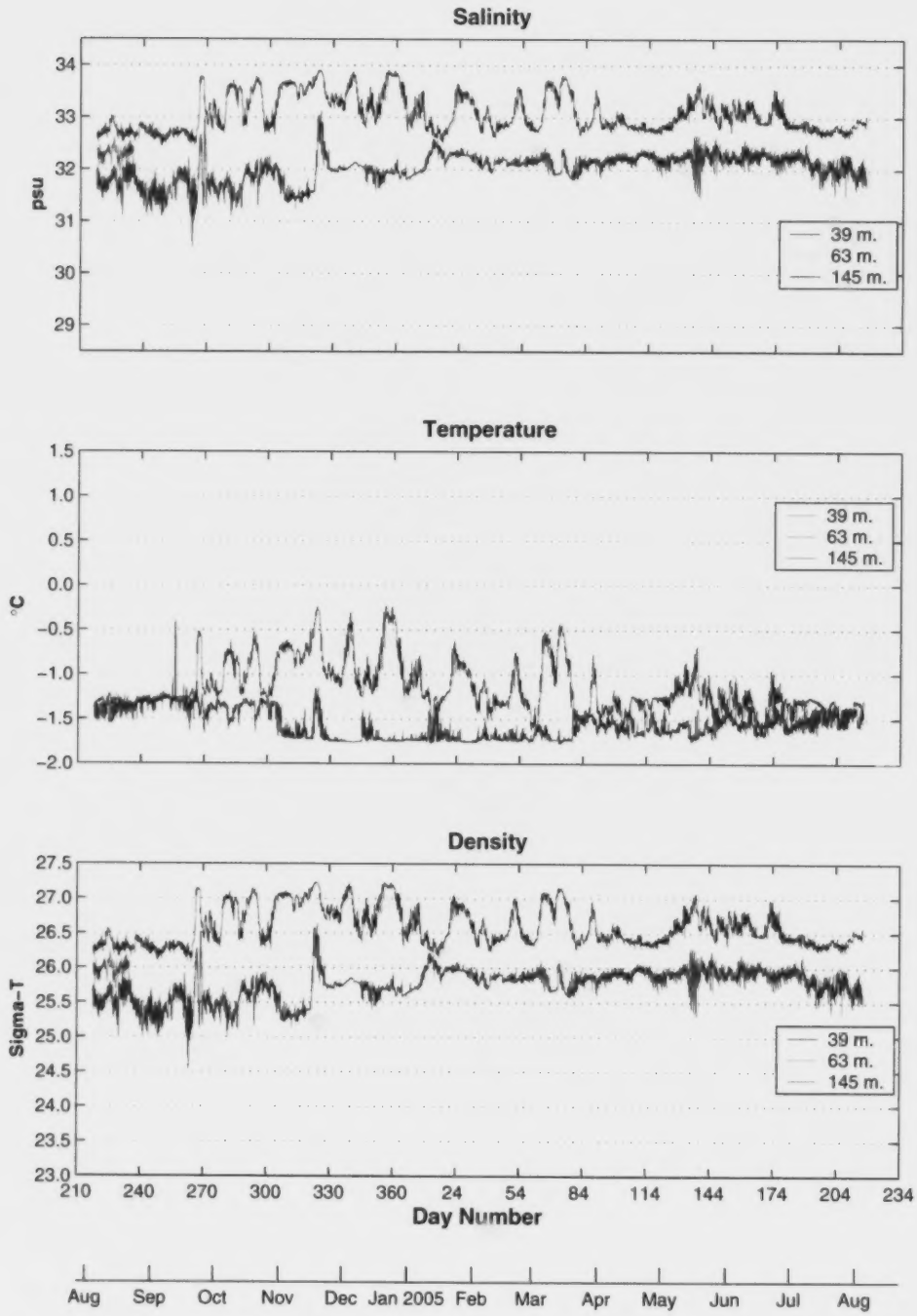


Figure 4 - Moored 30 min. CTD data, South Central Barrow Strait. August 2004 - August 2005

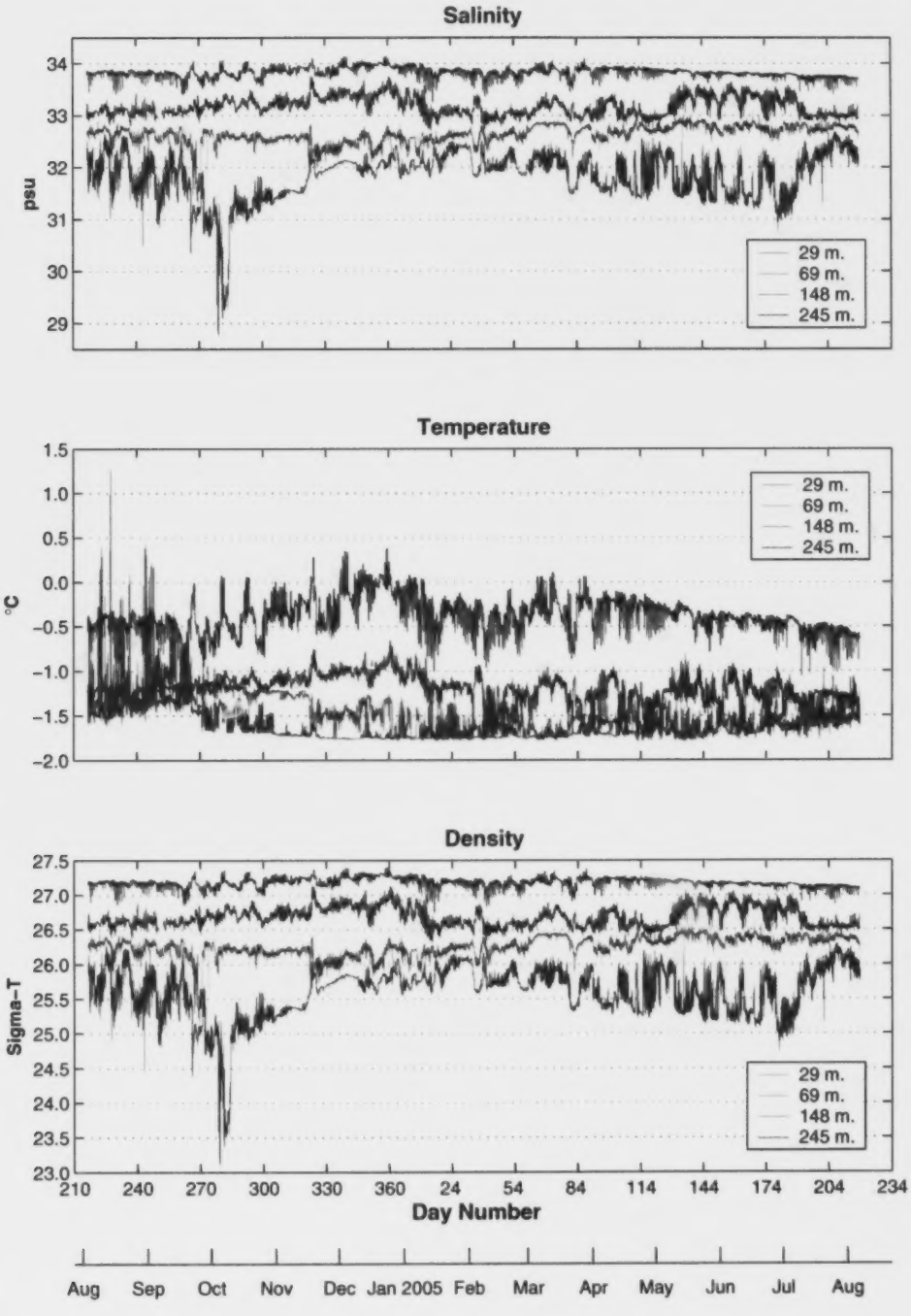


Figure 5 – Moored 30 min. CTD data, Central Barrow Strait.
August 2004 - August 2005

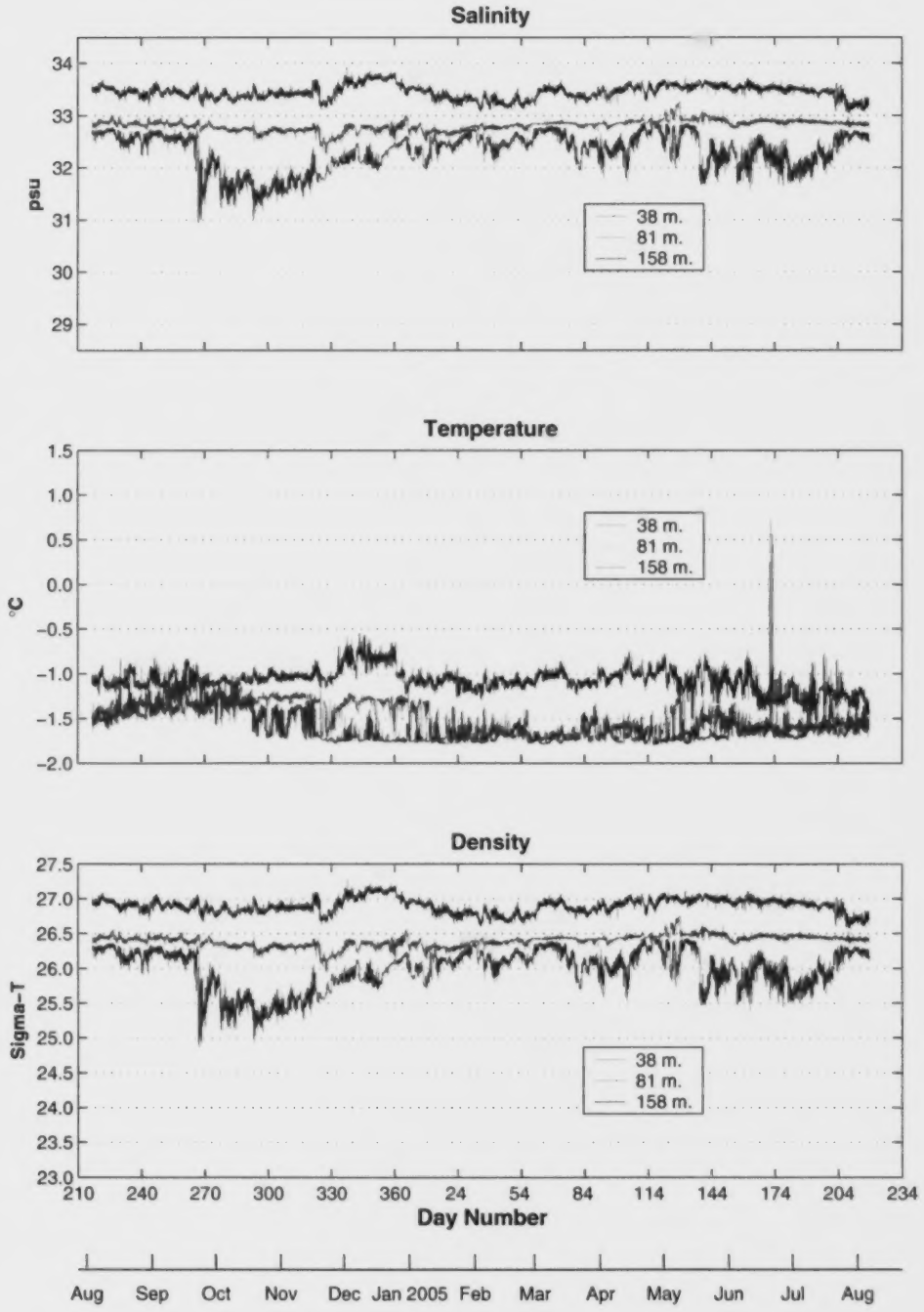


Figure 6 - Moored 30 min. CTD data, North Side Barrow Strait. August 2004 – August 2005

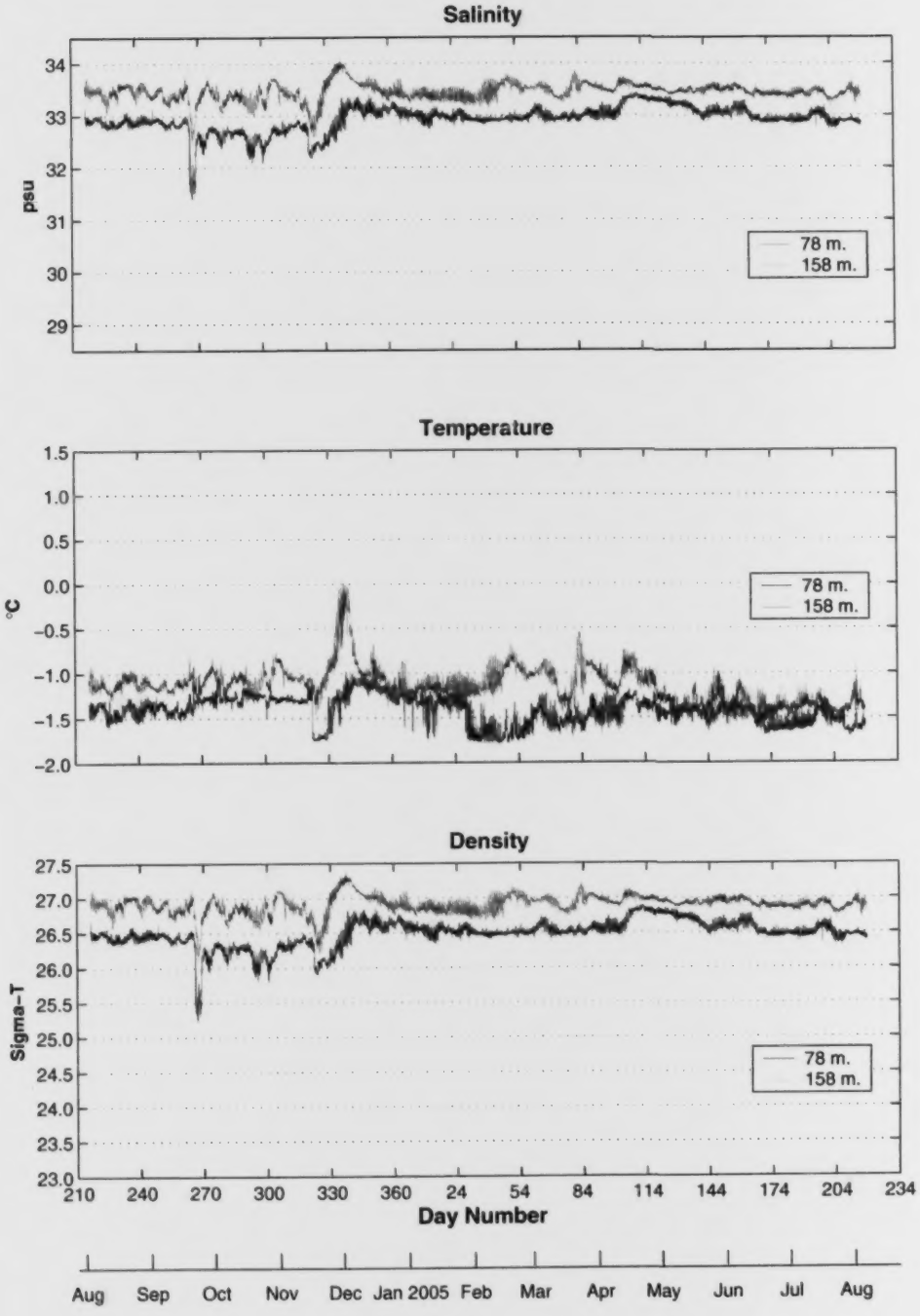


Figure 7 – Power Spectra of moored bi-hourly CTD data. South Side Barrow Strait: Aug. 2004 – Aug. 2005.

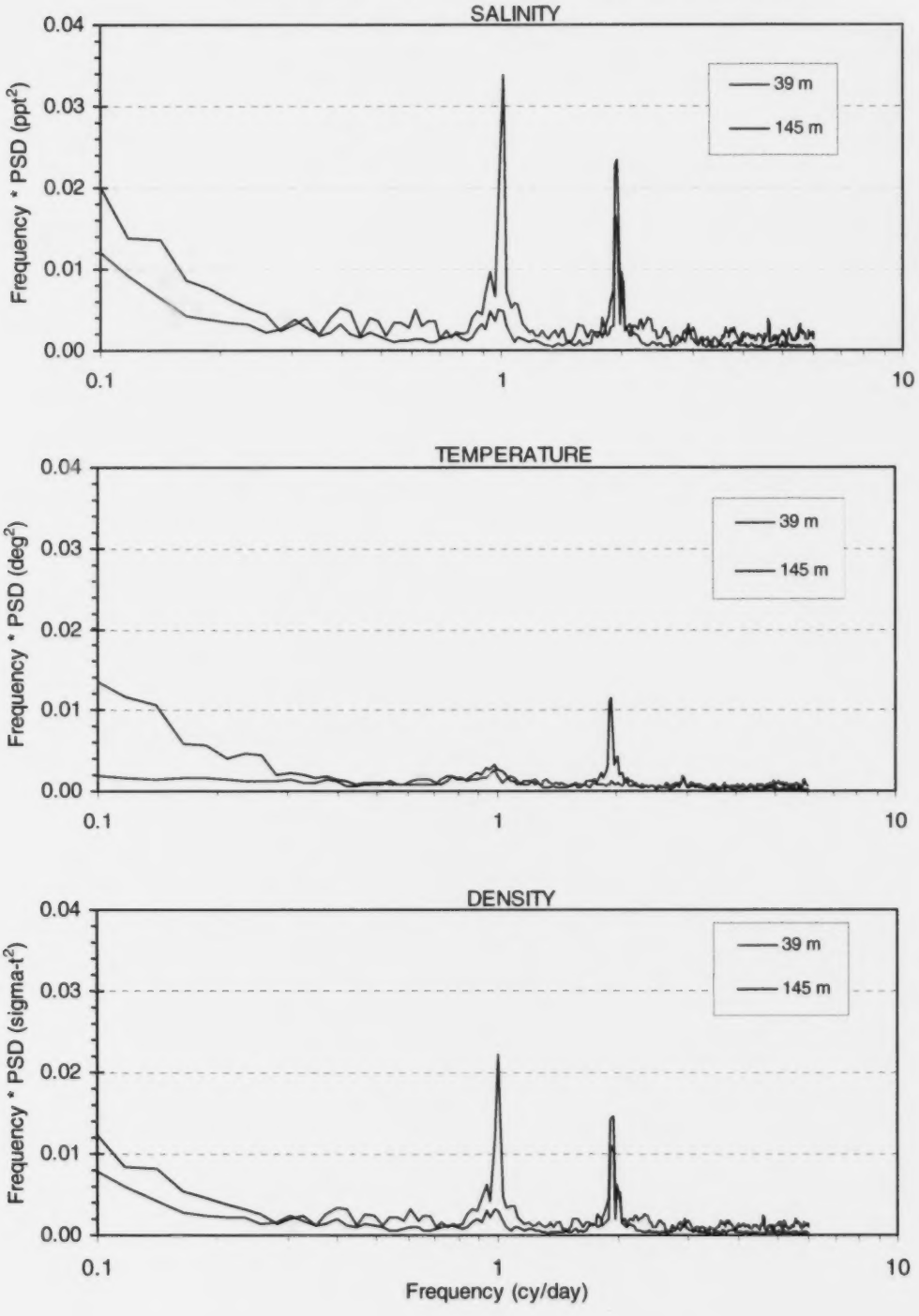


Figure 8 – Power Spectra of moored bi-hourly CTD data.
South Central Barrow Strait: Aug. 2004 – Aug. 2005.

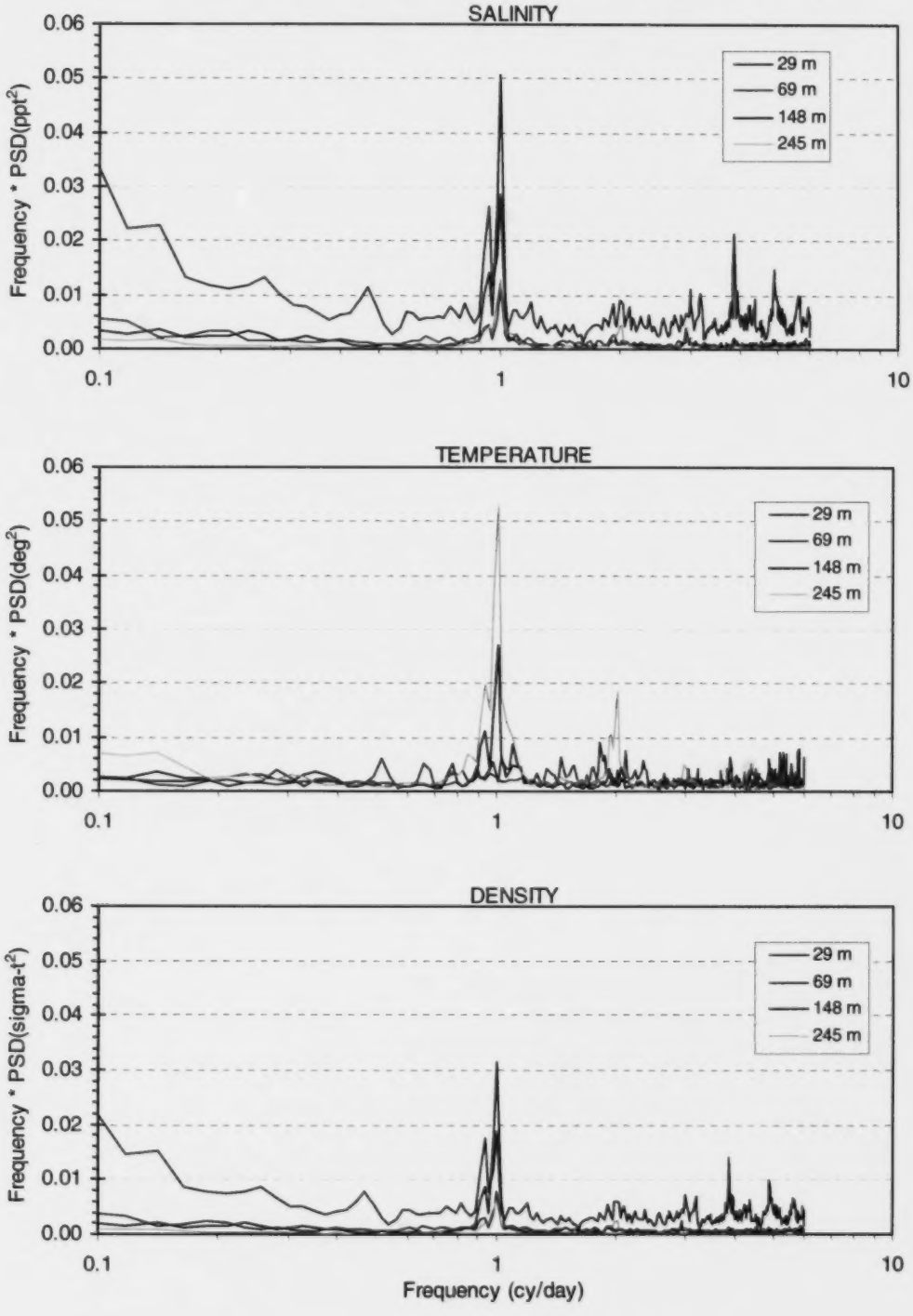


Figure 9 - Power Spectra of moored bi-hourly CTD data. Central Barrow Strait: Aug. 2004 – Aug. 2005

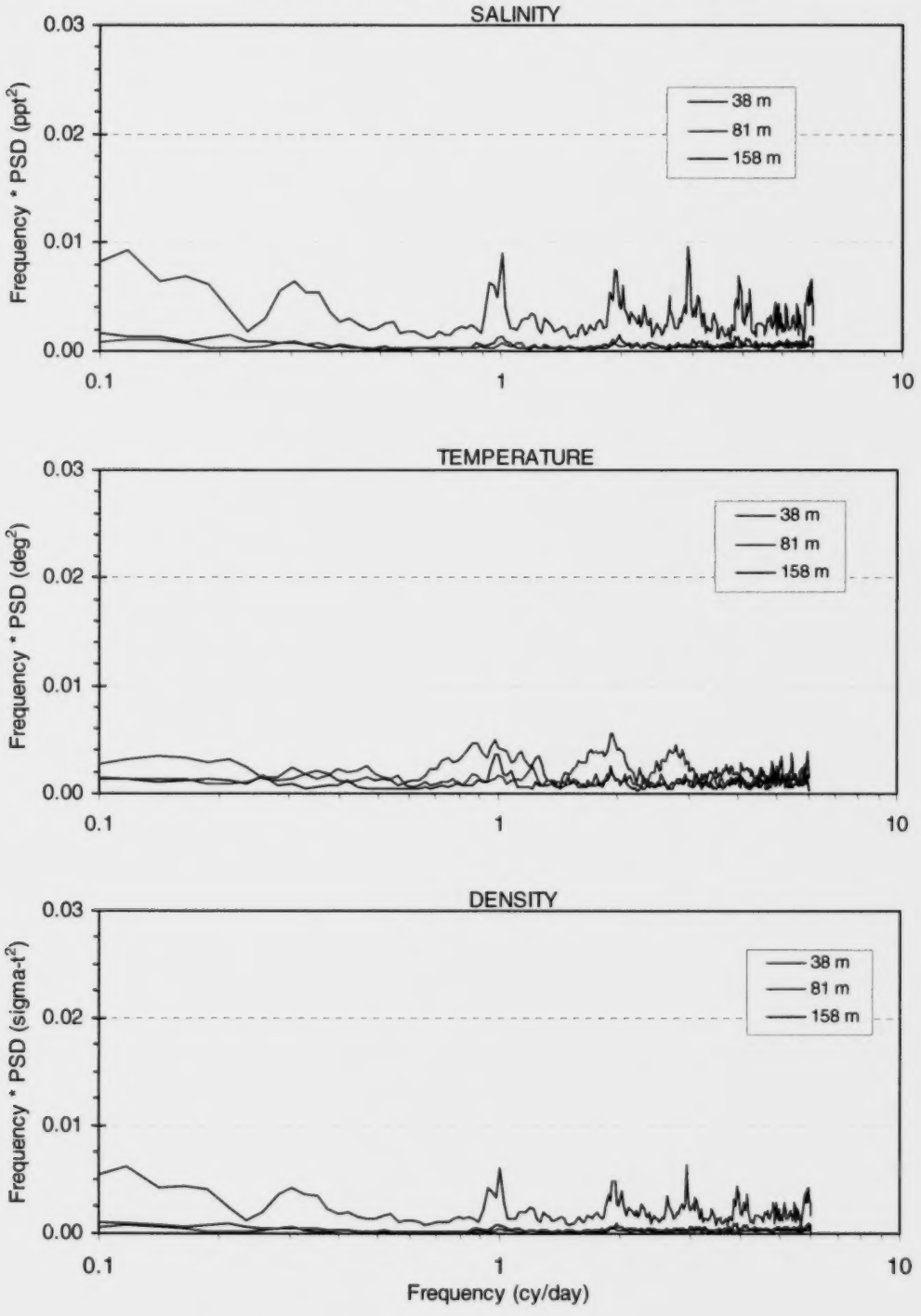


Figure 10 – Power Spectra of moored bi-hourly CTD data. North Barrow Strait: Aug. 2004 – Aug. 2005.

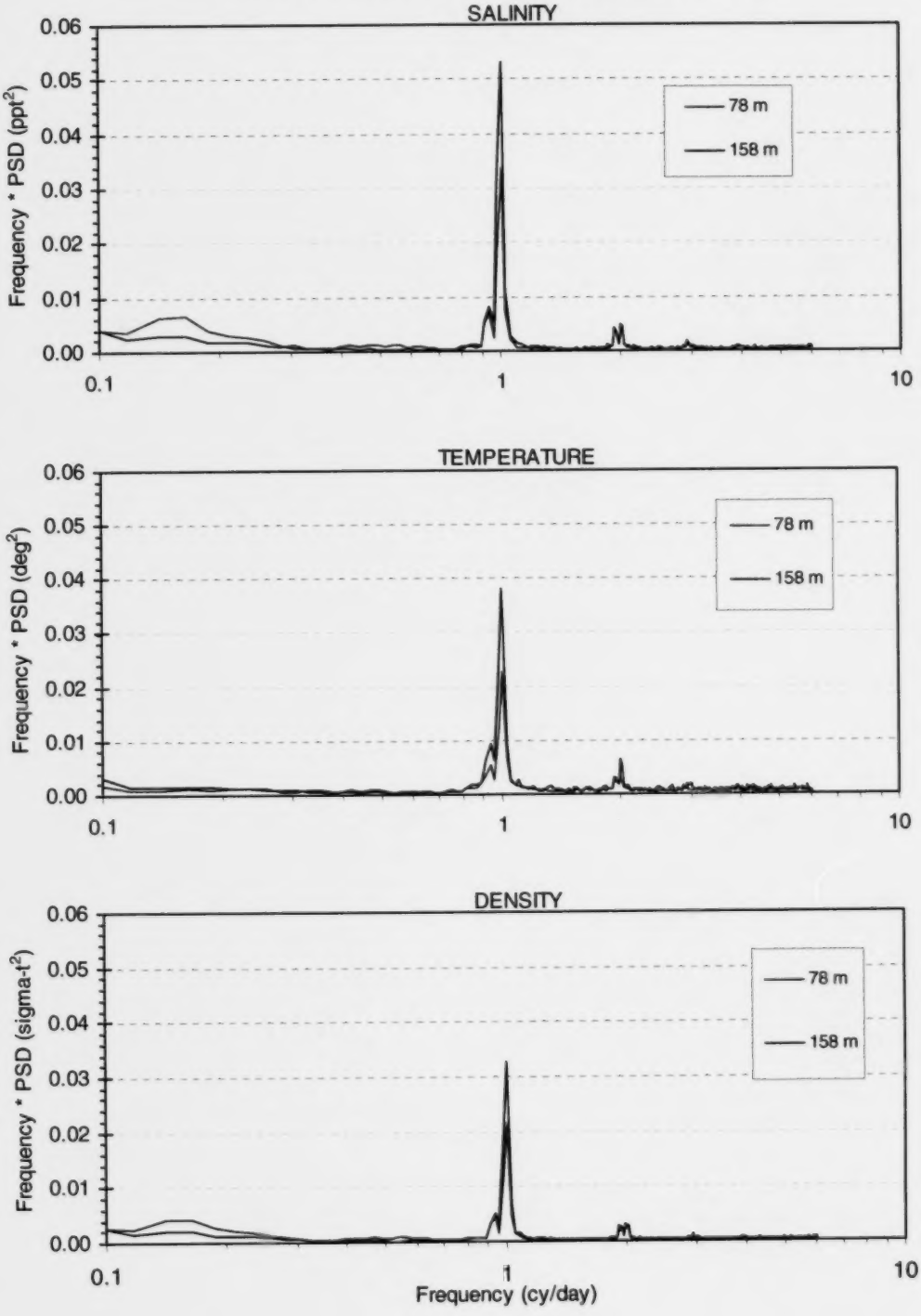


Figure 11 - Bihourly current data, South Side Barrow Strait.
Sep. 1, 2004 – Sep. 30, 2004

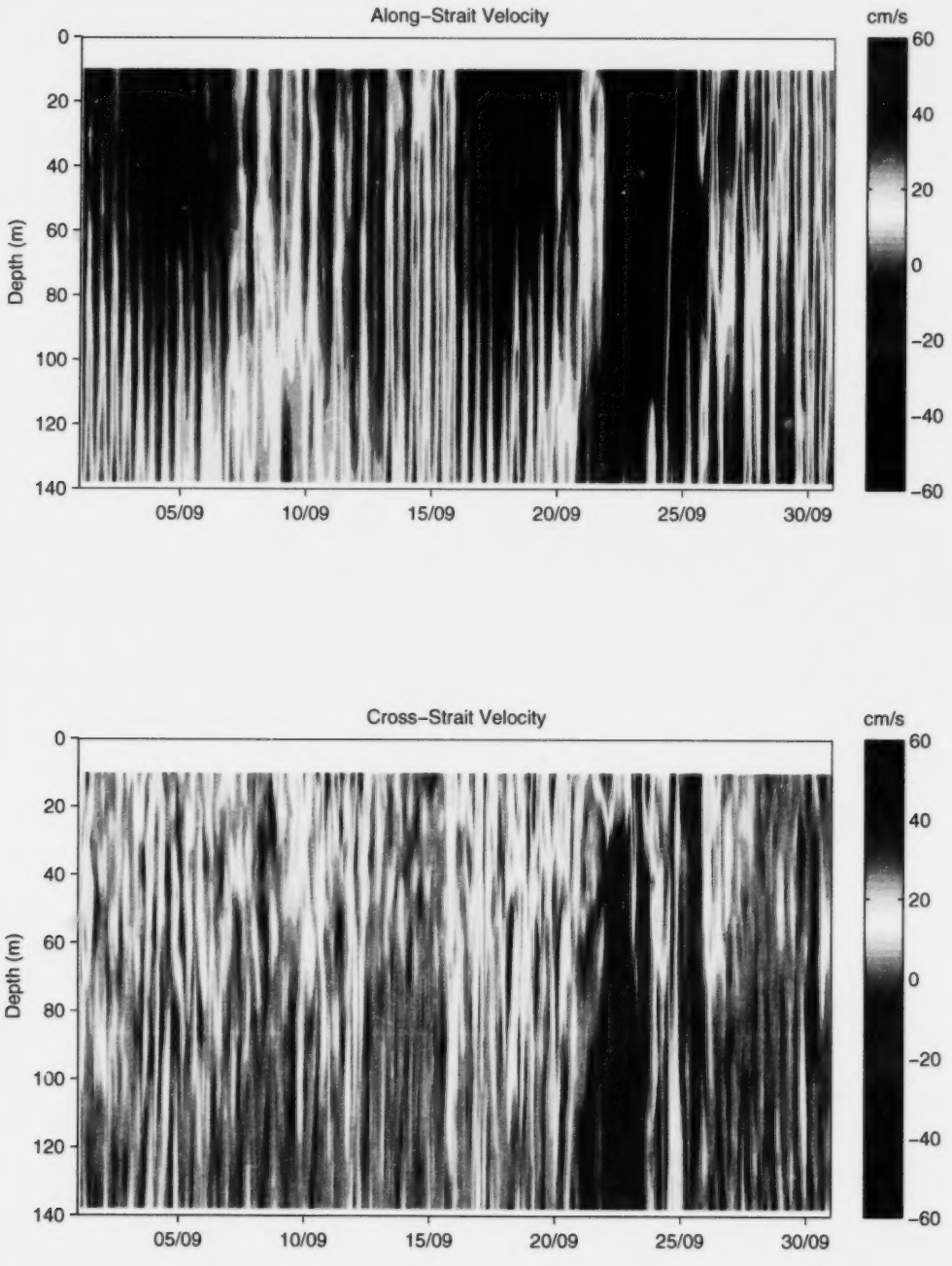
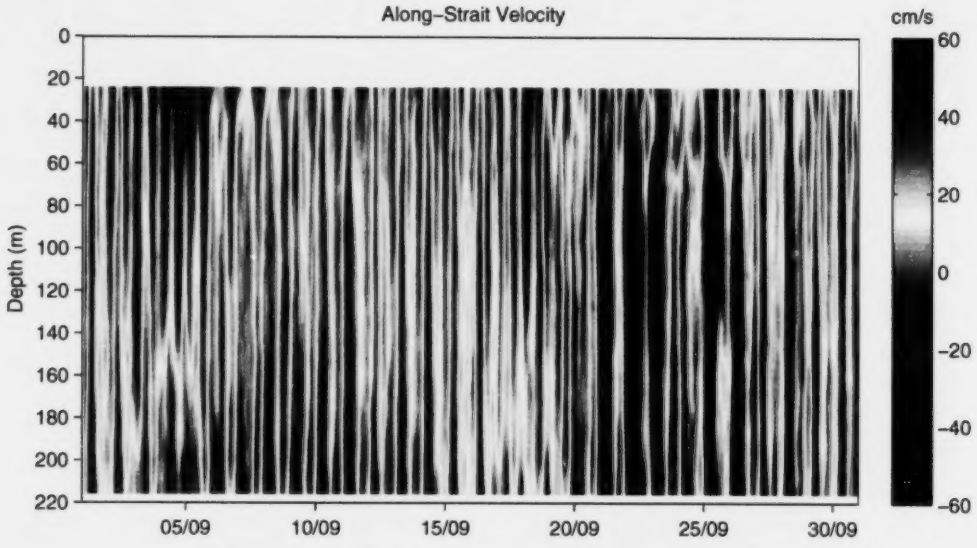


Figure 12 - Bihourly current data, South Central Barrow Strait.
Sep. 1, 2004 – Sep. 30, 2004



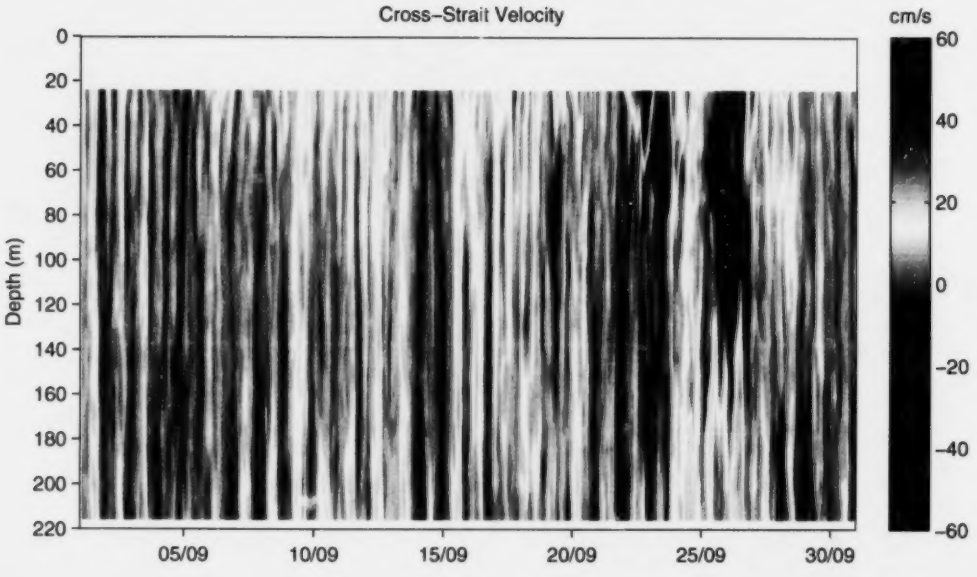


Figure 13 - Bihourly current data, Central Barrow Strait.
Sep. 1, 2004 – Sep. 30, 2004

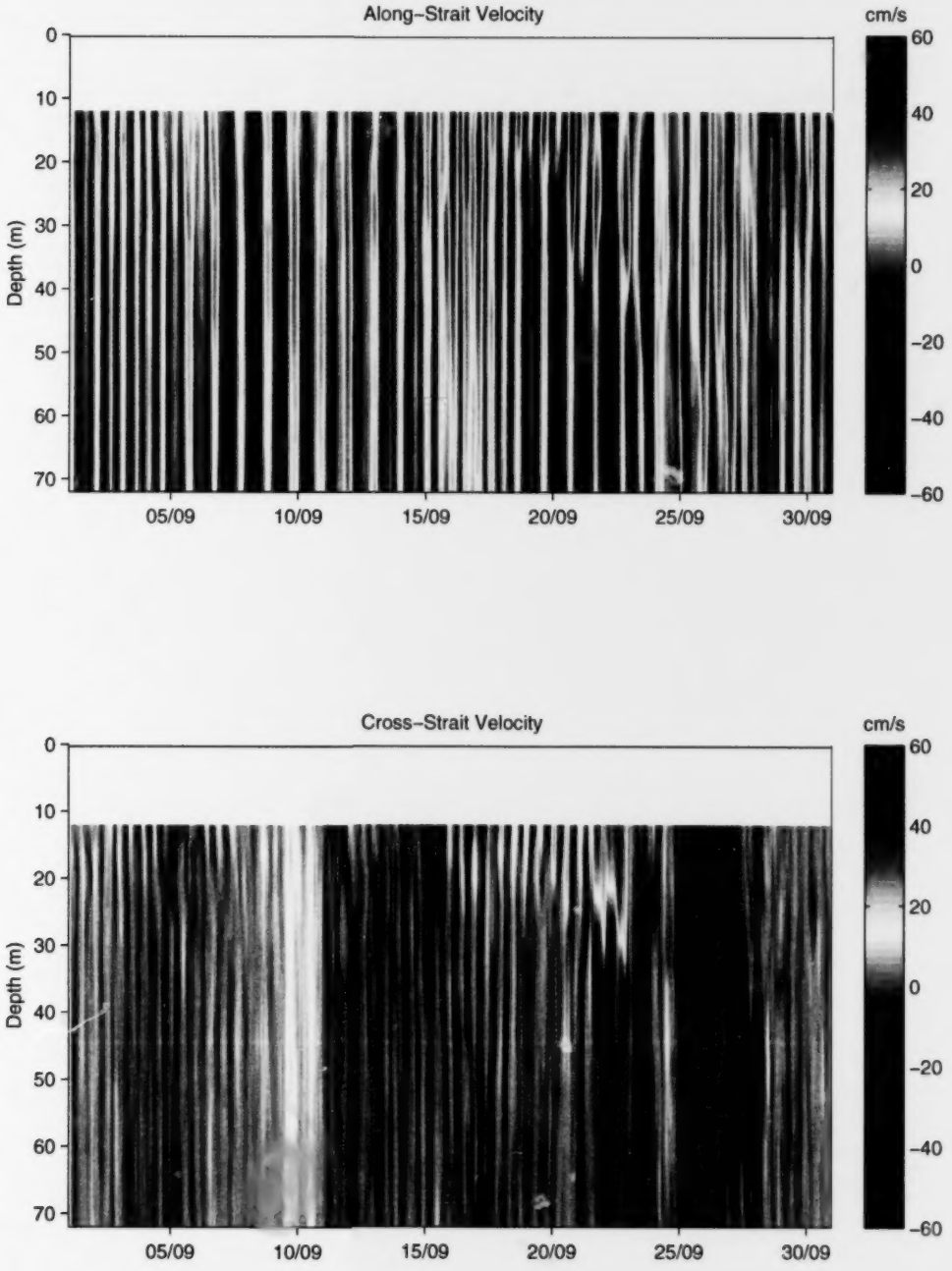
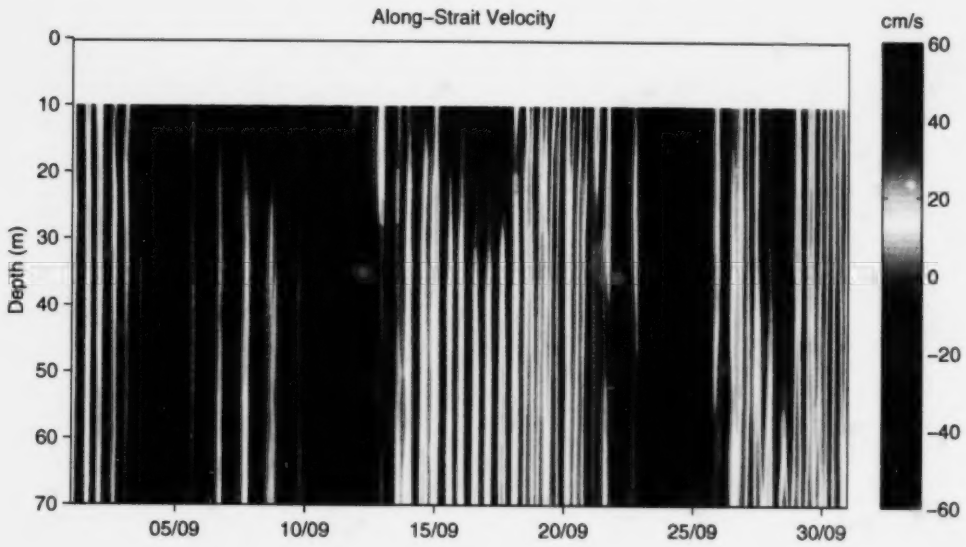


Figure 14 - Bihourly current data, North Side Barrow Strait.
Sep. 1, 2004 – Sep. 30, 2004



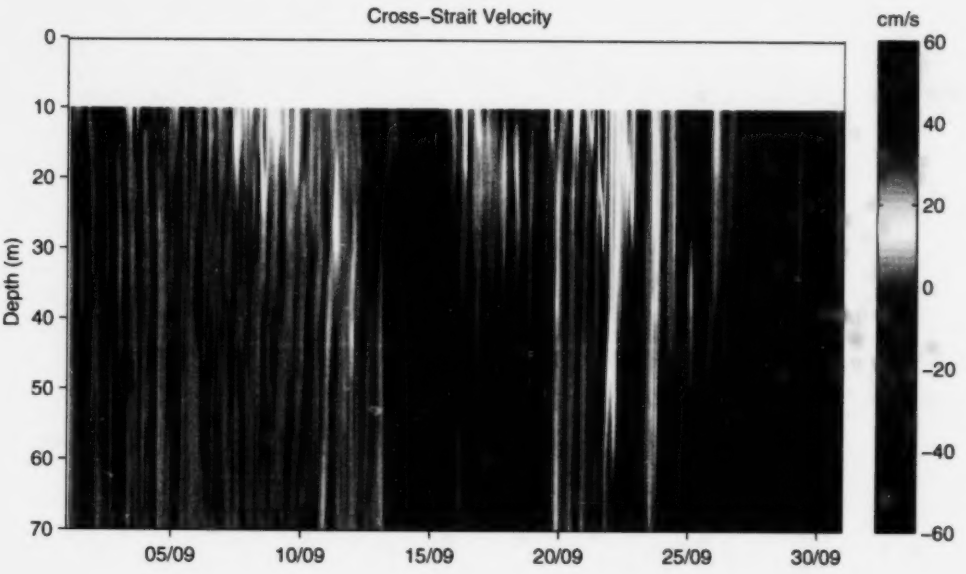


Figure 15 - Low-pass filtered currents, South Side Barrow Strait. August 2004 - August 2005

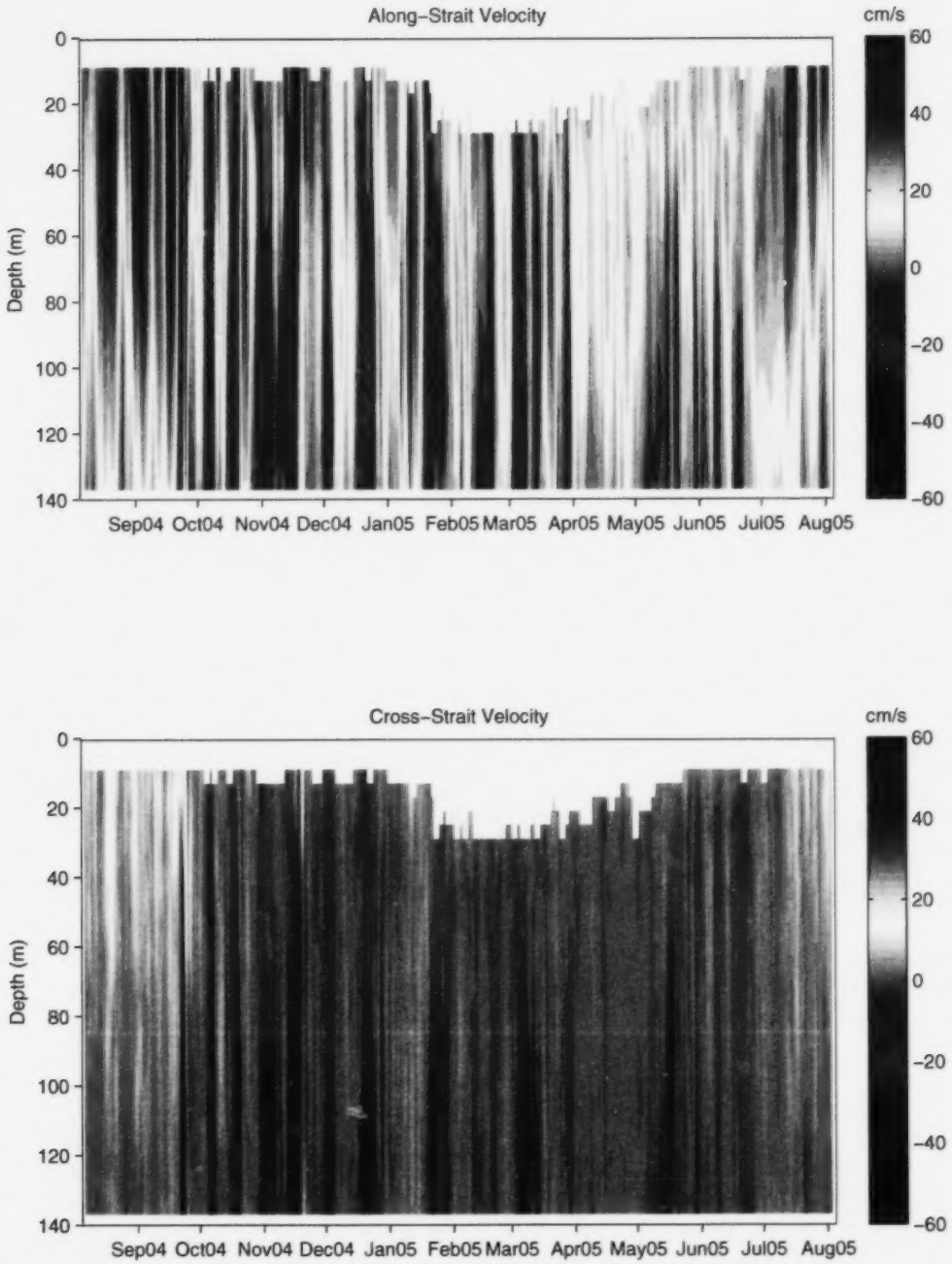


Figure 16 - Low-pass filtered currents, South Central Barrow Strait. August 2004 - August 2005

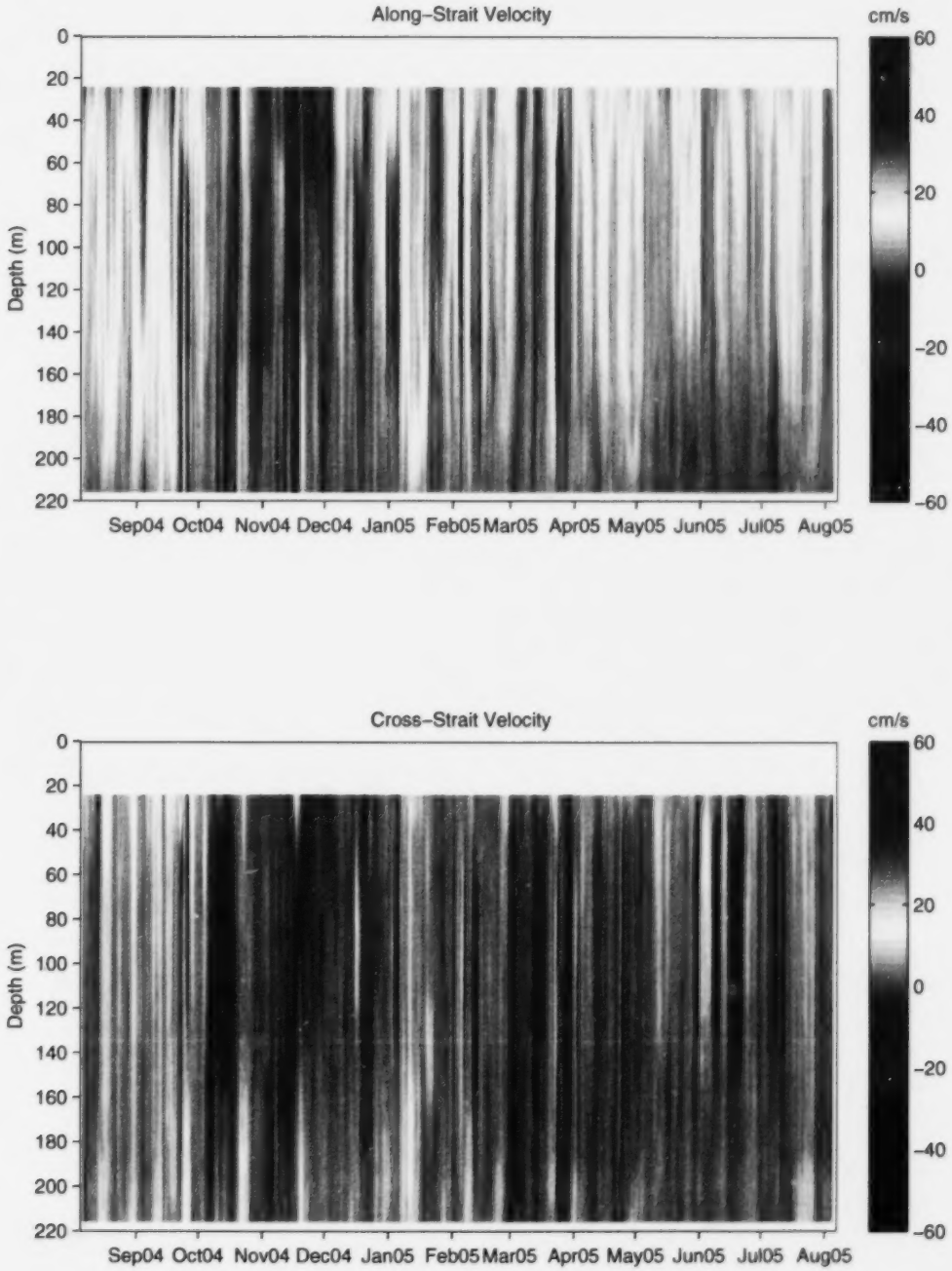
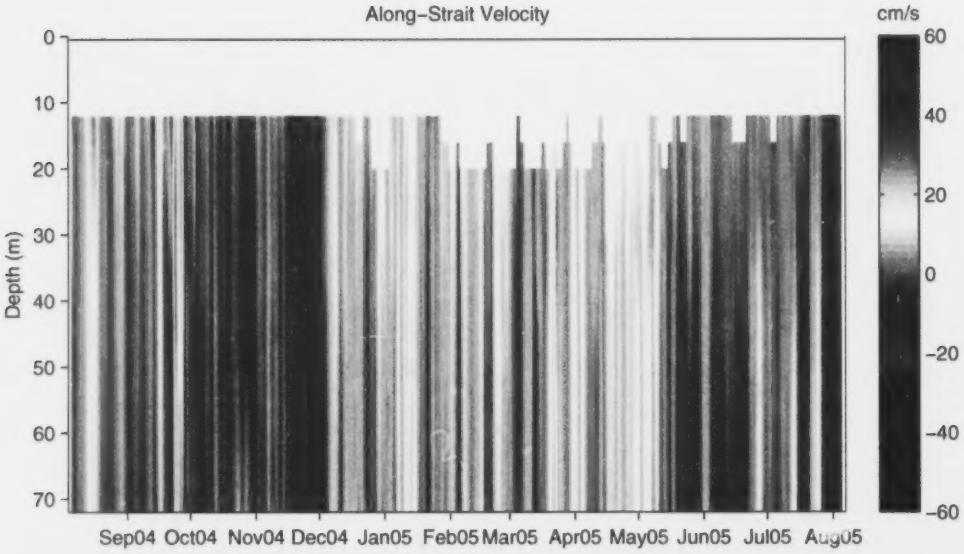


Figure 17 - Low-pass filtered currents, Central Barrow Strait. August 2004 - August 2005



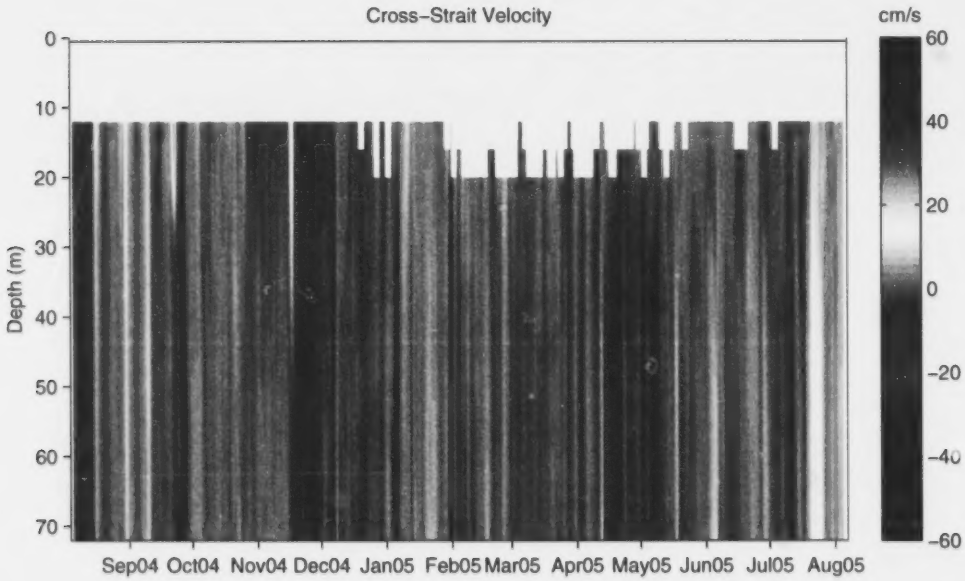
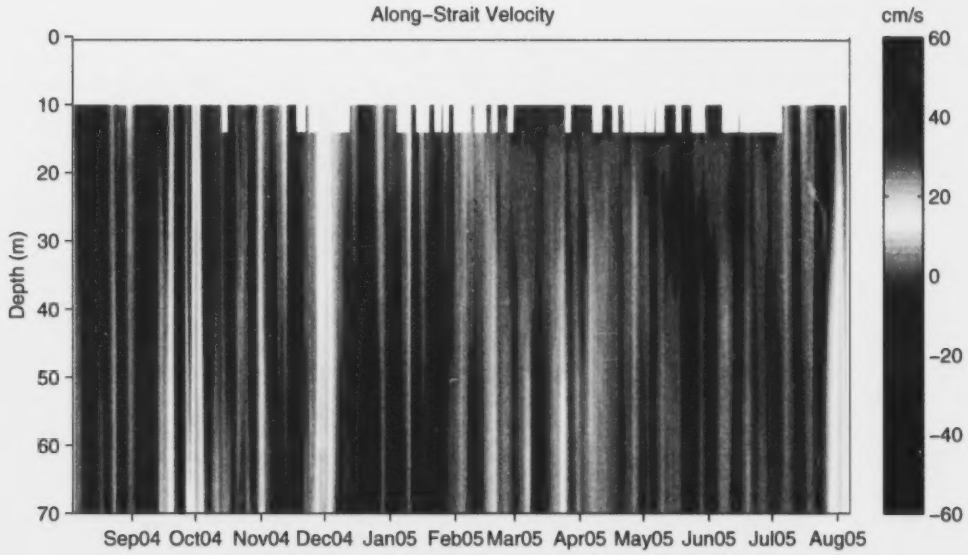


Figure 18 - Low-pass filtered currents, North Side Barrow Strait. August 2004 - August 2005



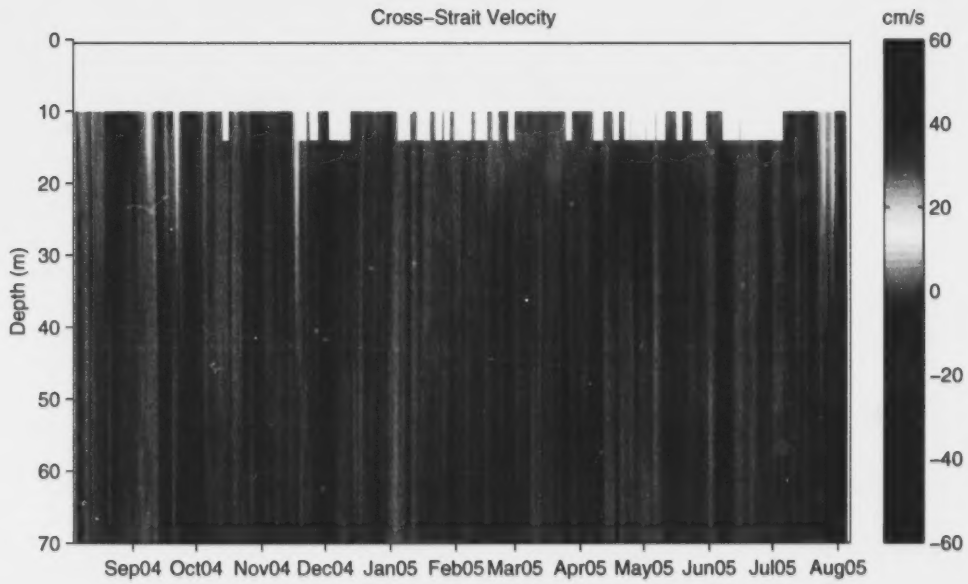


Figure 19 - Low-pass filtered T,S (39 m.) and current data (38 m.). South Side Barrow Strait: August 2004 - August 2005.

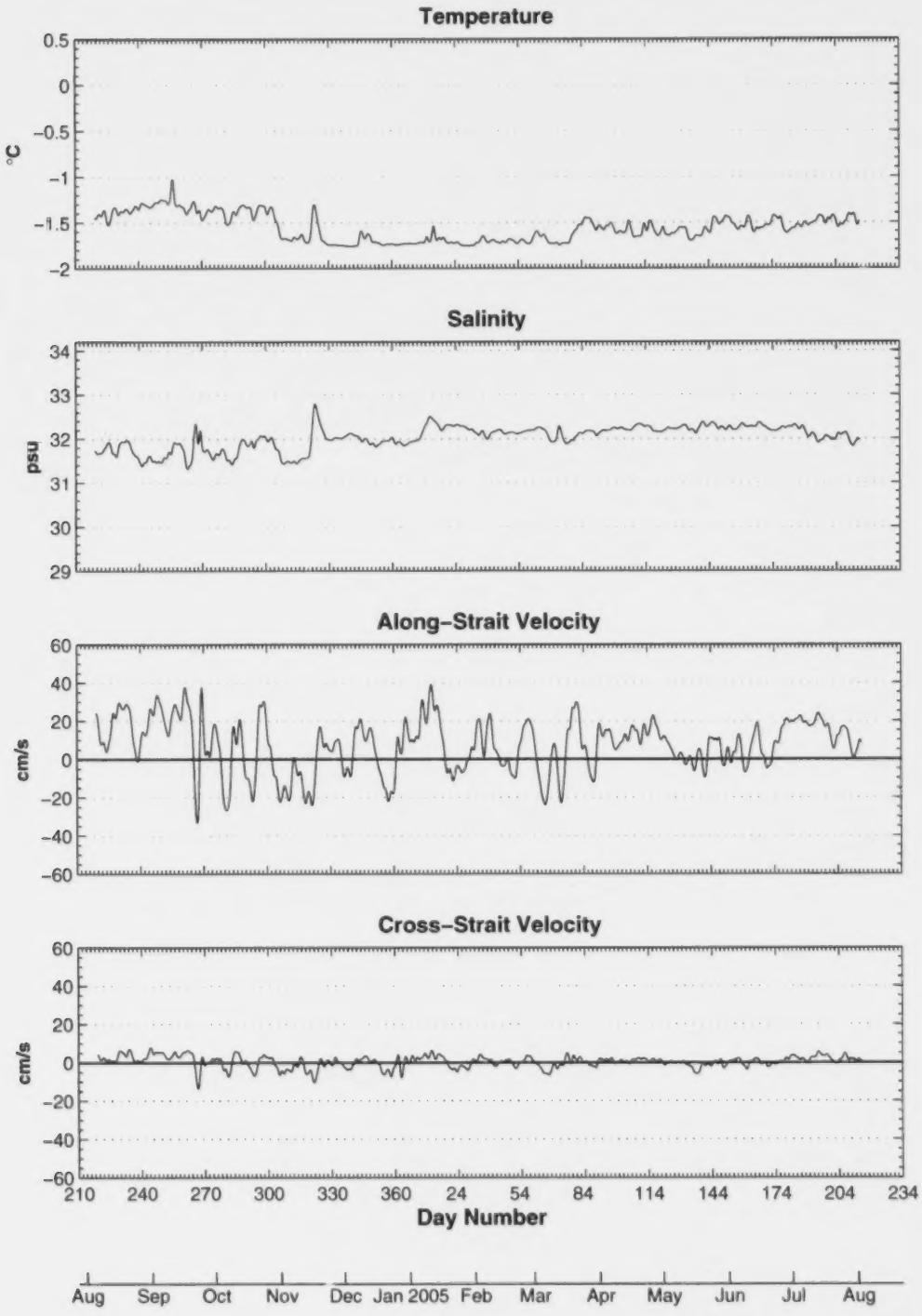


Figure 20 - Low-pass filtered T,S (63 m.) and current data (62 m.). South Side Barrow Strait: August 2004 - August 2005.

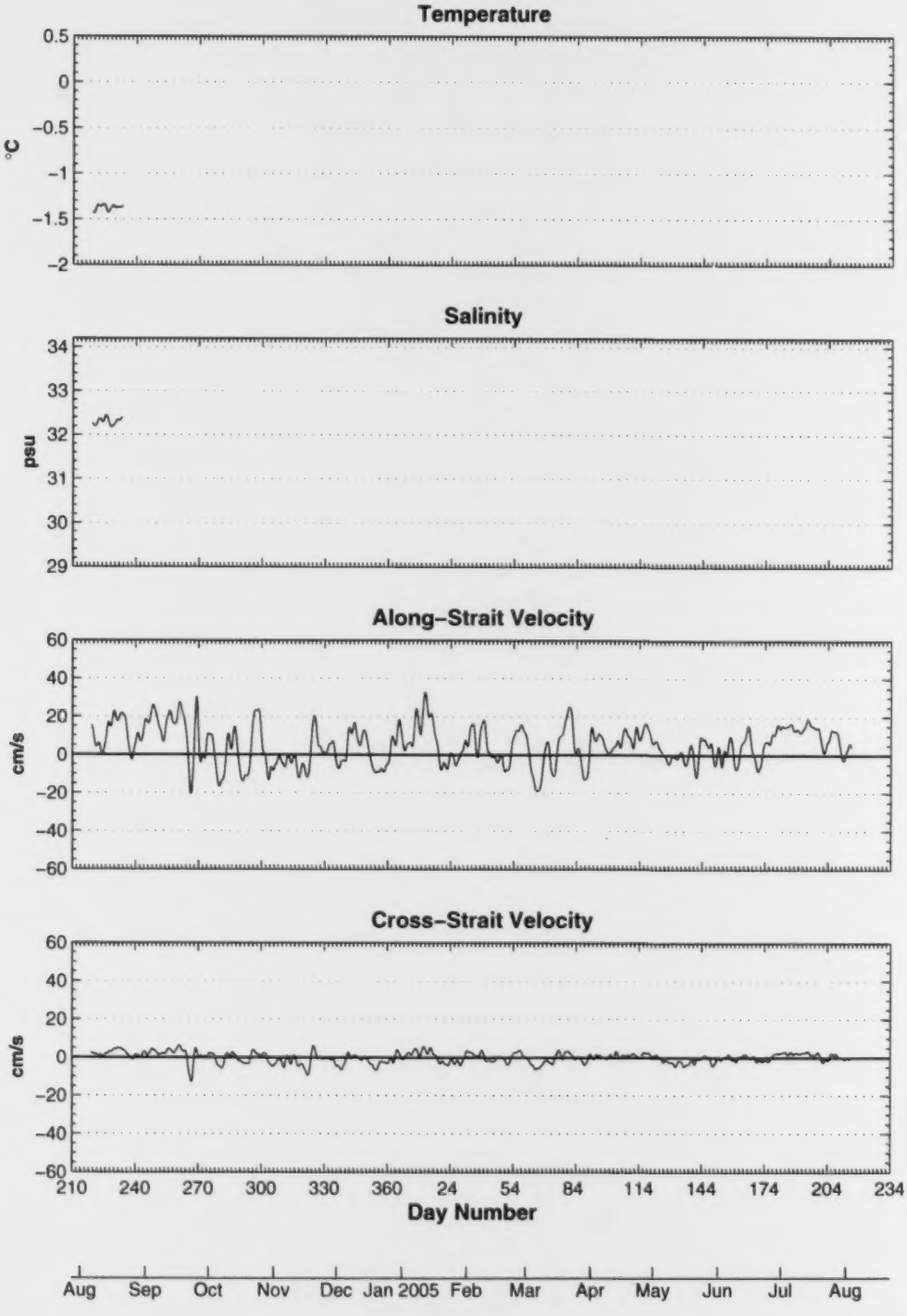


Figure 21 - Low-pass filtered T,S (145 m.) and current data (137 m.). South Side Barrow Strait: August 2004 - August 2005.

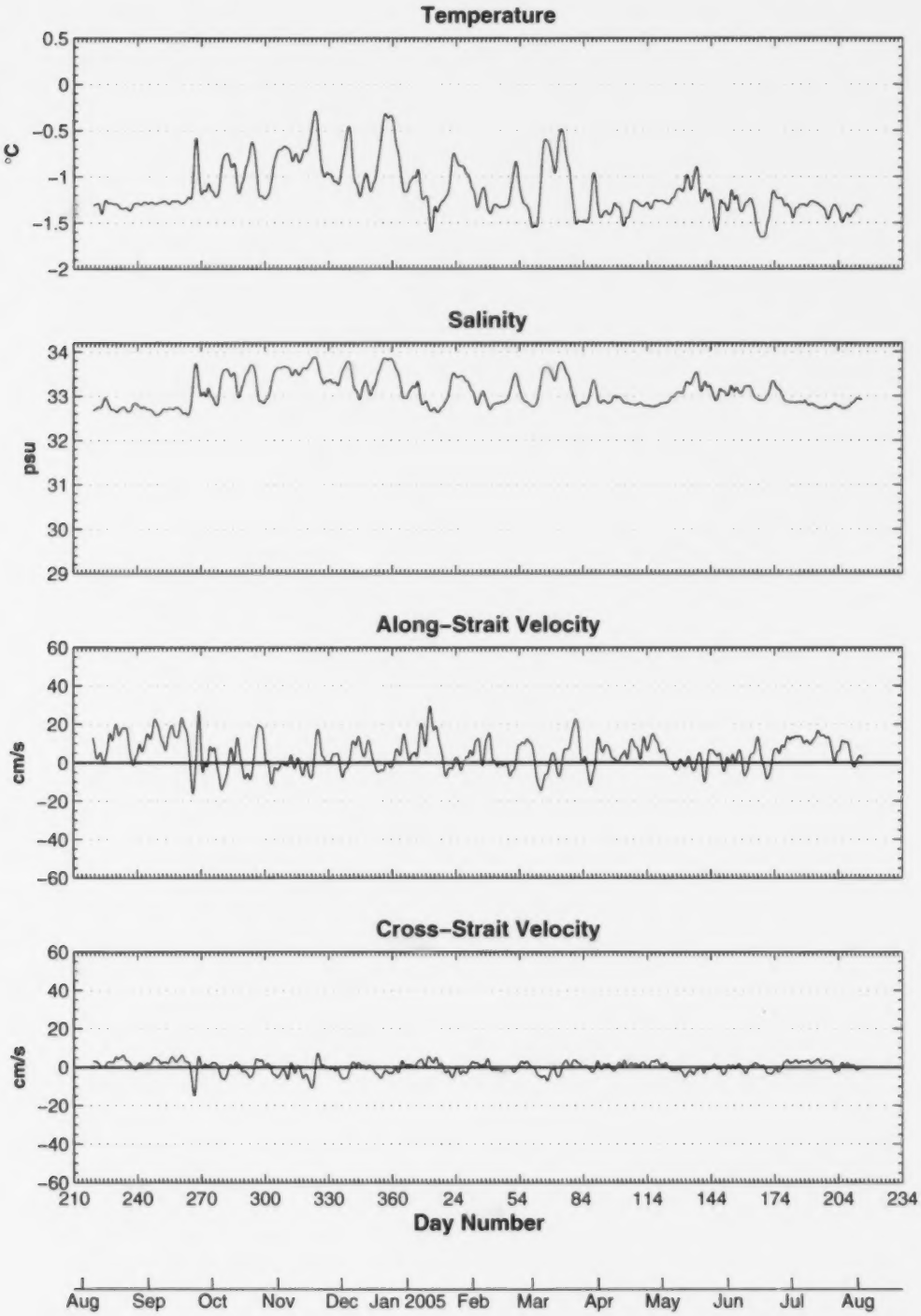


Figure 22 - Low-pass filtered T,S (29 m.) and current data (32 m.). South Central Barrow Strait: August 2004 - August 2005.

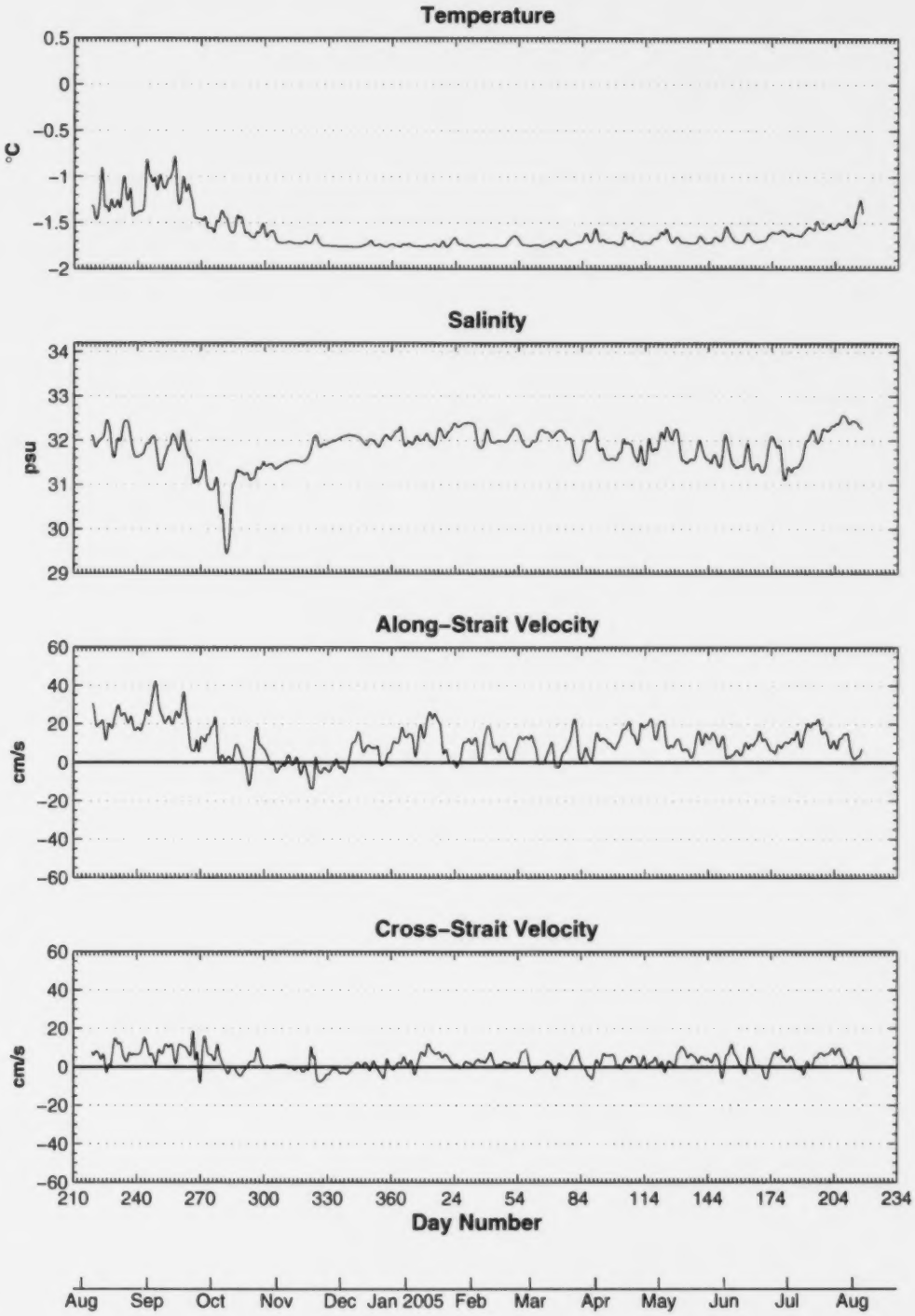


Figure 23 - Low-pass filtered T,S (69 m.) and current data (72 m.). South Central Barrow Strait: August 2004 - August 2005.

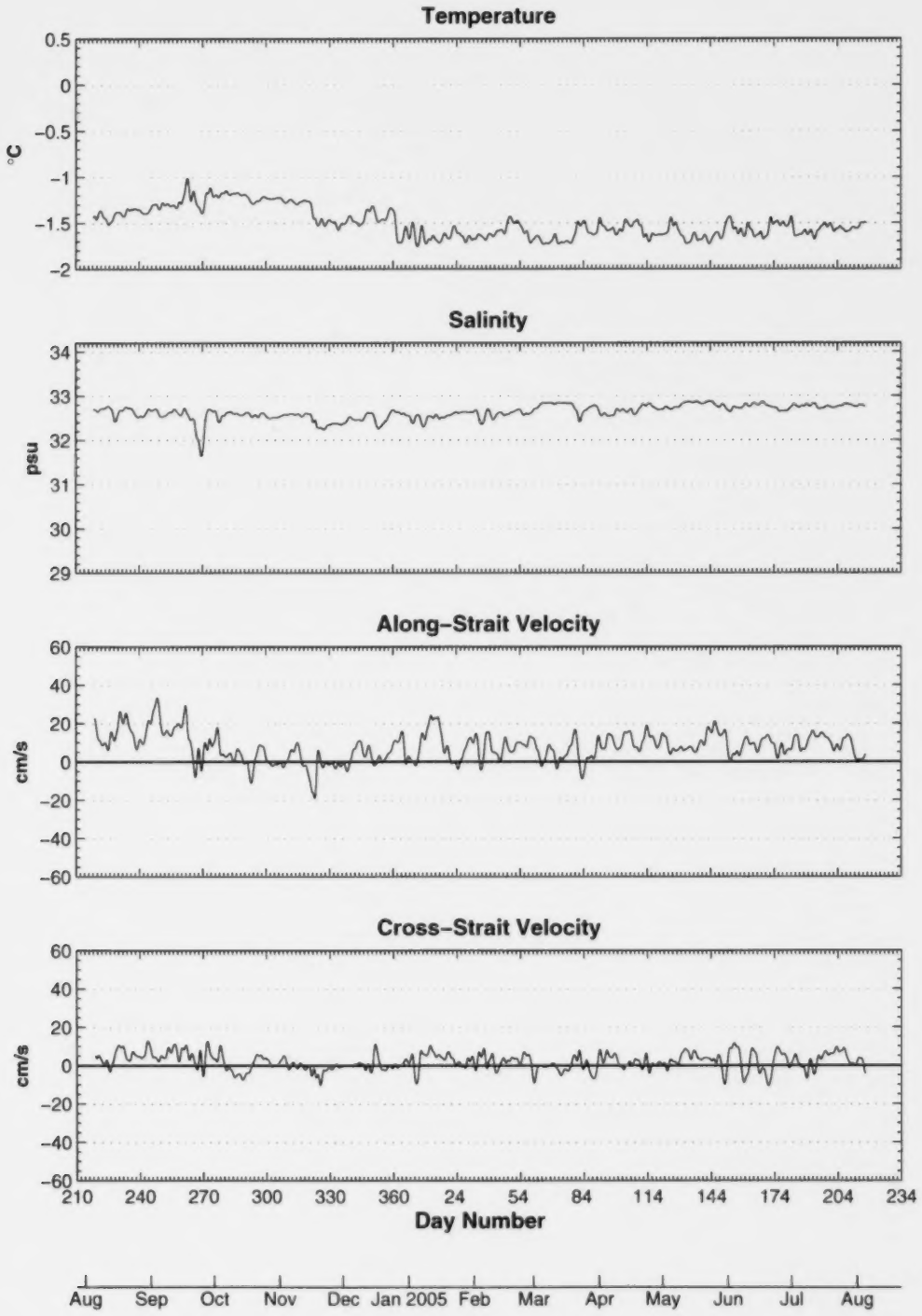


Figure 24 - Low-pass filtered T,S (148 m.) and current data (152 m.). South Central Barrow Strait: August 2004 - August 2005.

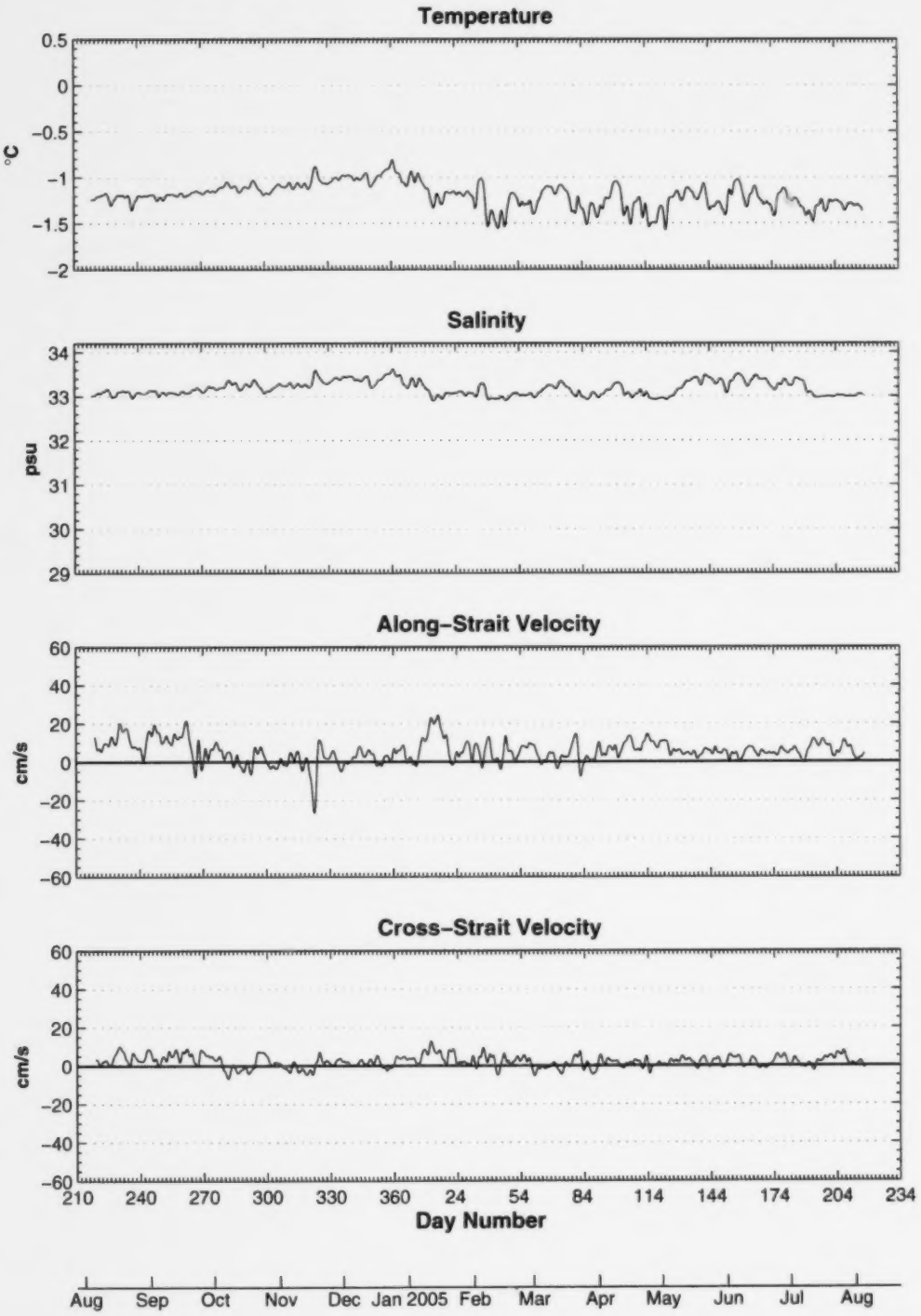


Figure 25 - Low-pass filtered T,S (245 m.) and current data (216 m). South Central Barrow Strait: August 2004 - August 2005.

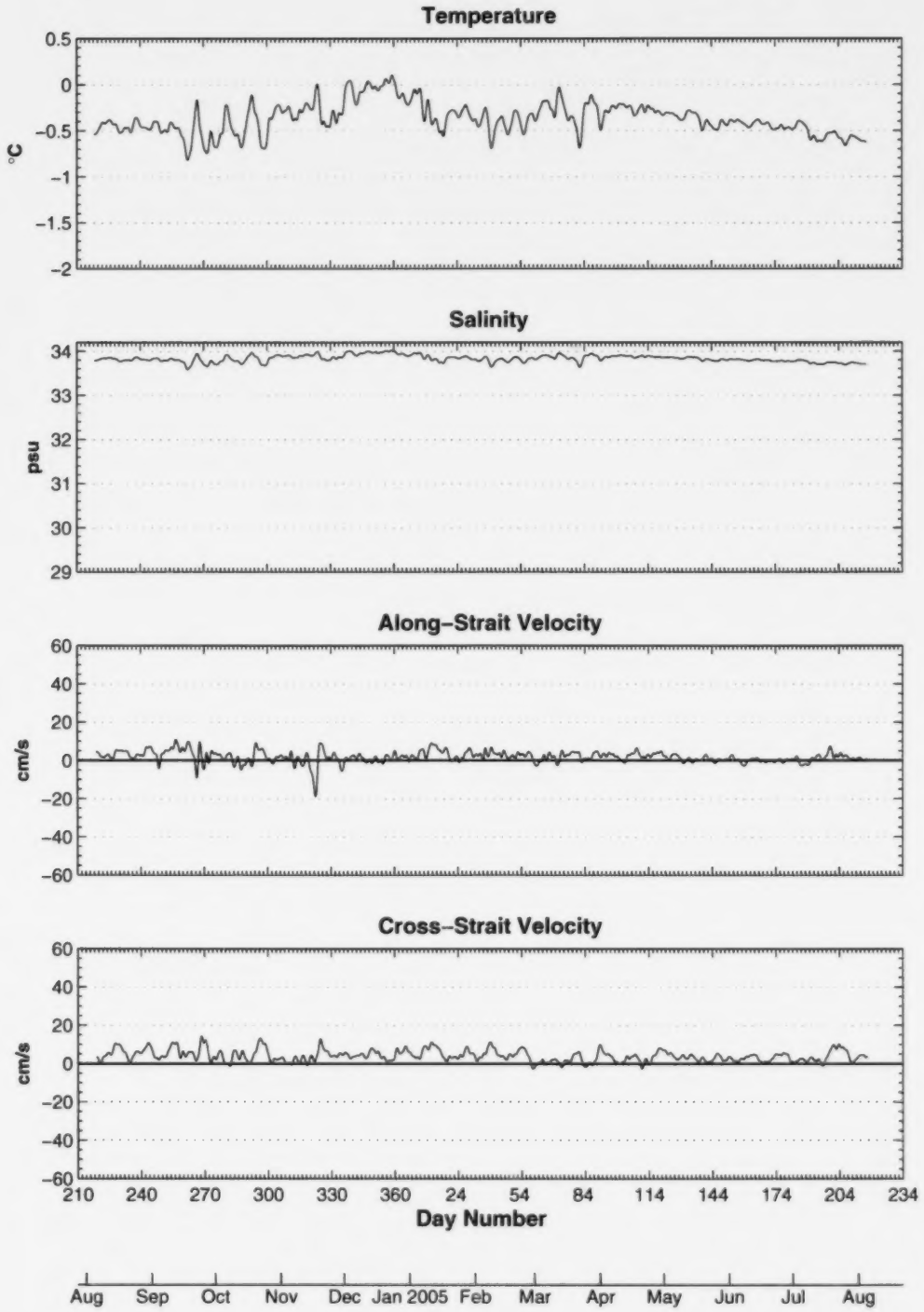


Figure 26 - Low-pass filtered T,S (38 m.) and current data (40 m.). Central Barrow Strait: August 2004 – August 2005.

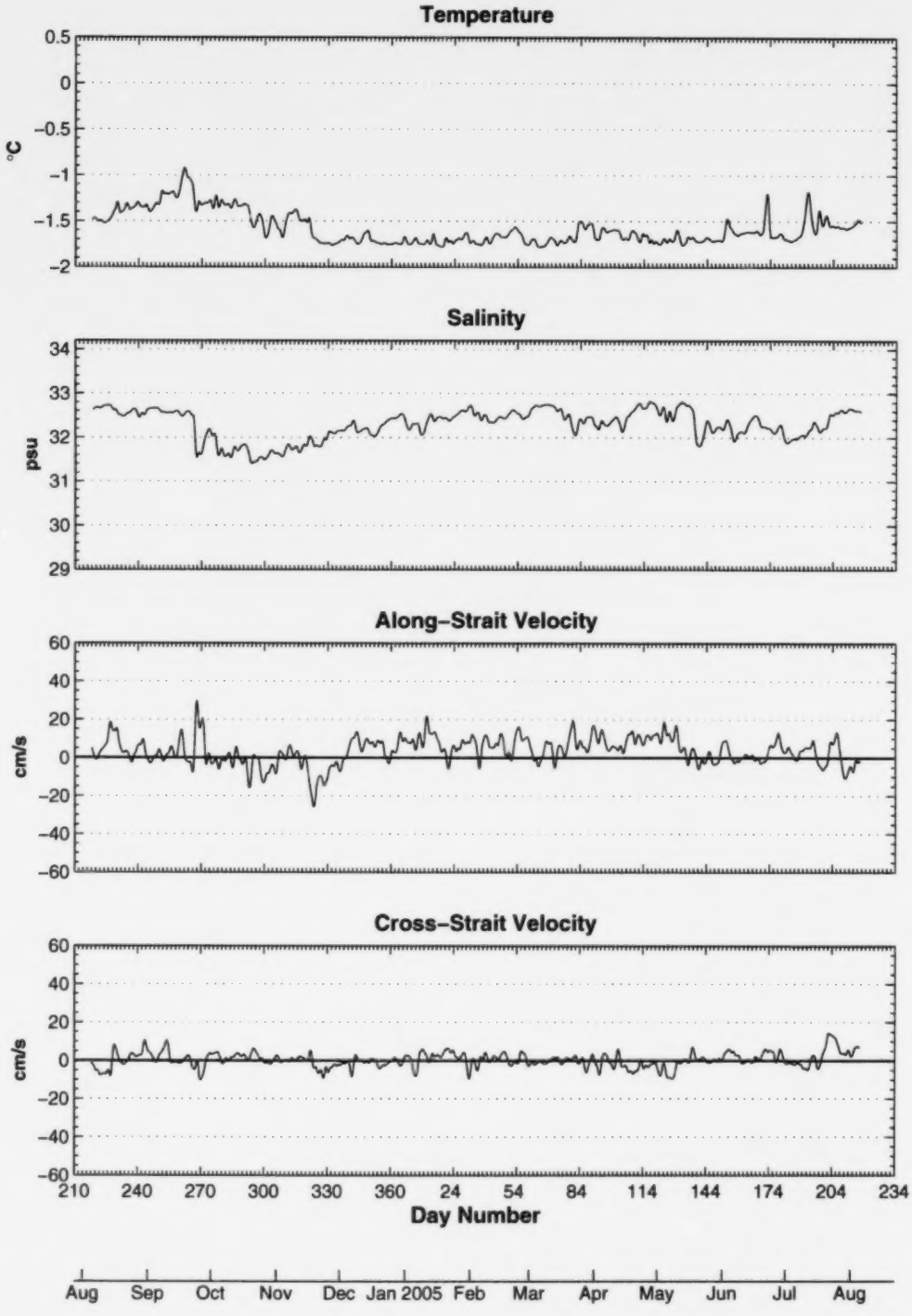


Figure 27 - Low-pass filtered T,S (81 m.) and current data (72 m.). Central Barrow Strait: August 2004 - August 2005.

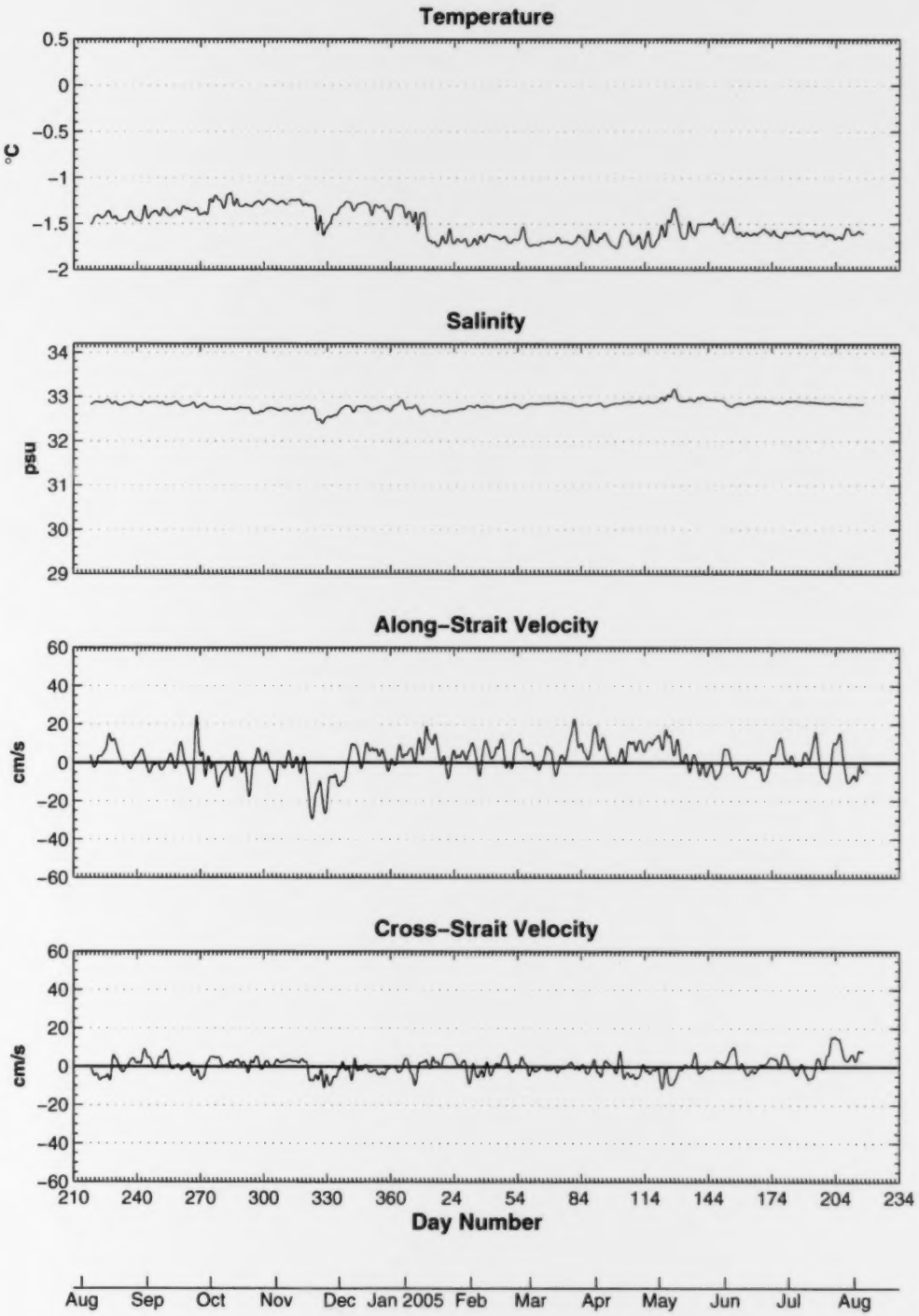


Figure 28 - Low-pass filtered T,S (158 m.).
Central Barrow Strait: August 2004 - August 2005.

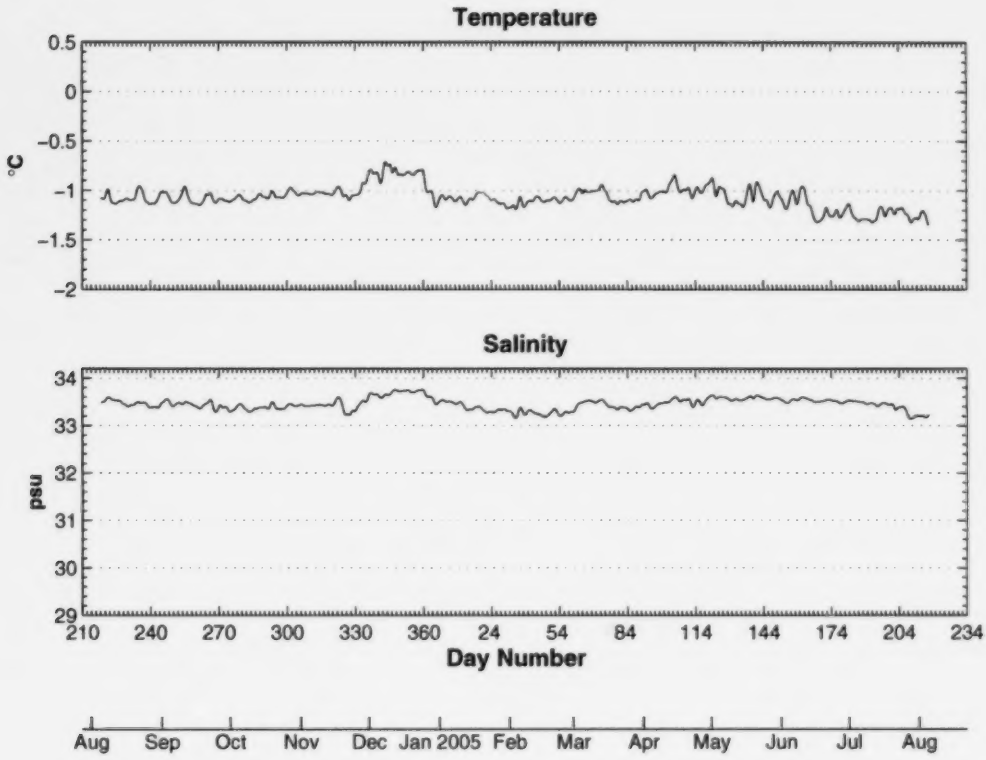


Figure 29 - Low-pass filtered T,S (78 m.) and current data (70 m.). North Side Barrow Strait: August 2004 - August 2005.

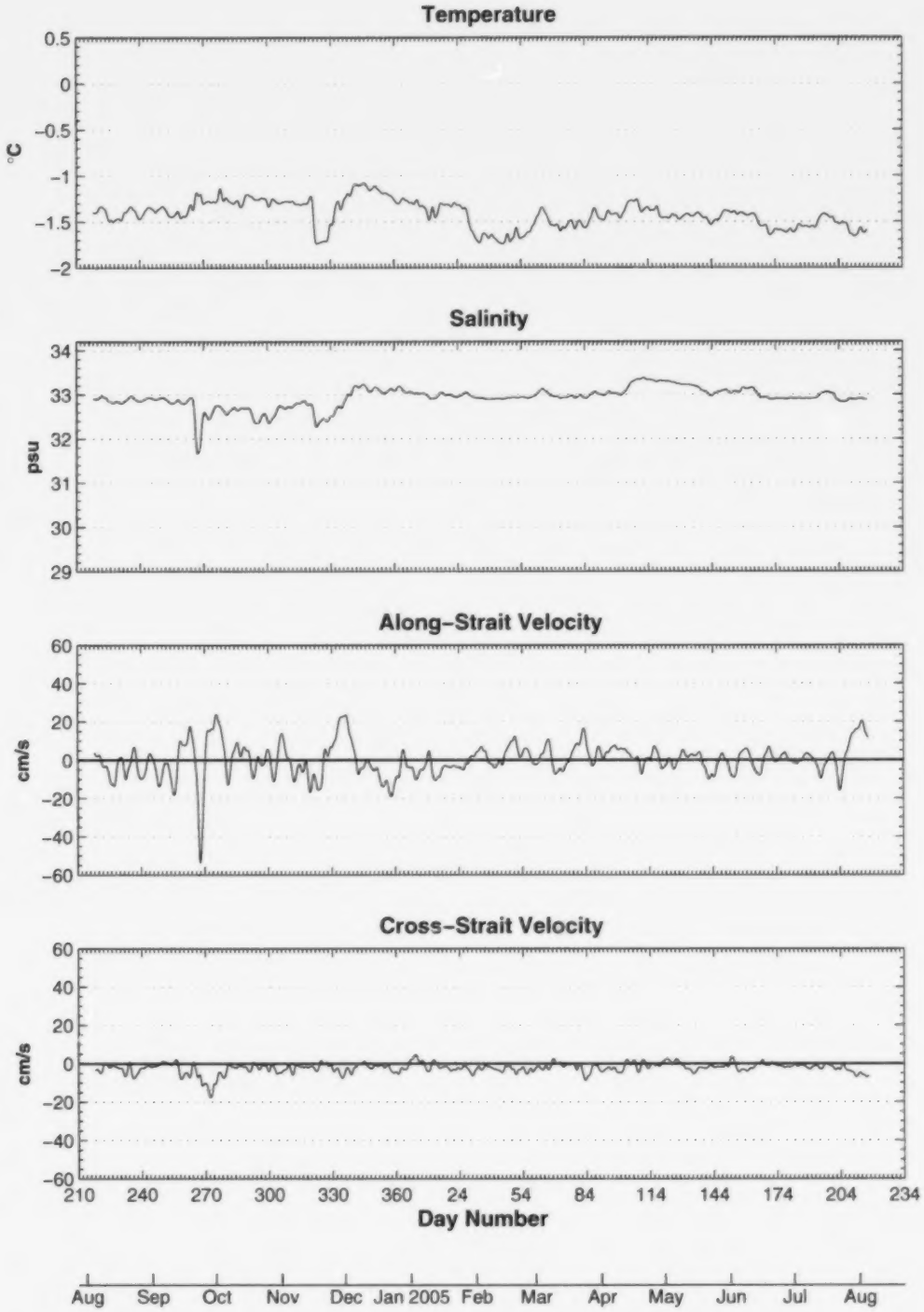


Figure 30 - Low-pass filtered T,S (158 m.).
North Side Barrow Strait: August 2004 - August 2005.

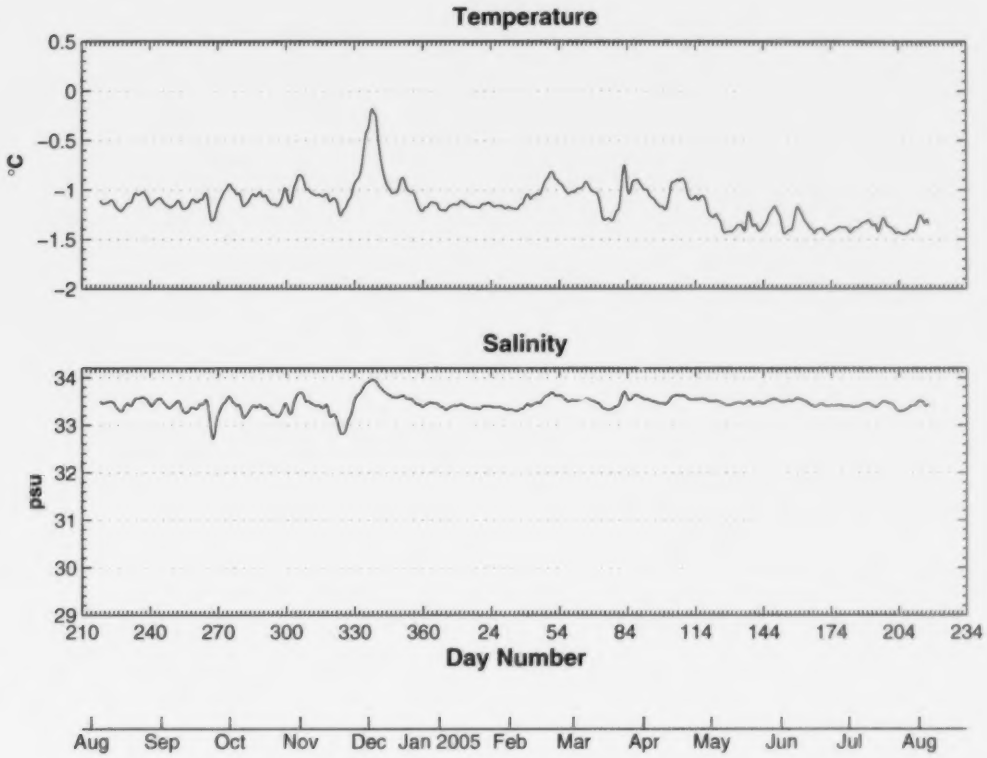
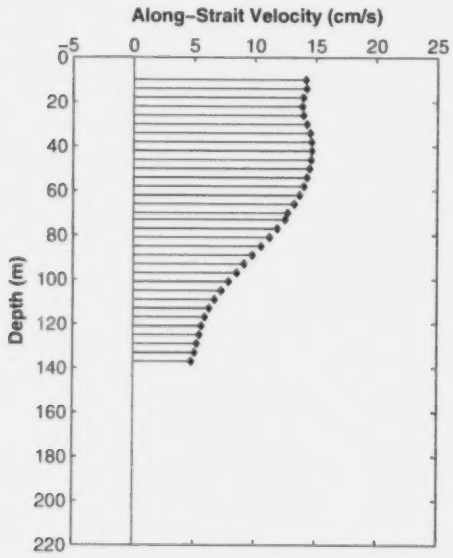
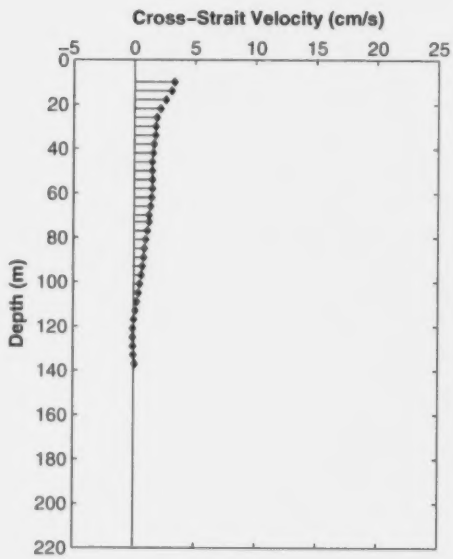


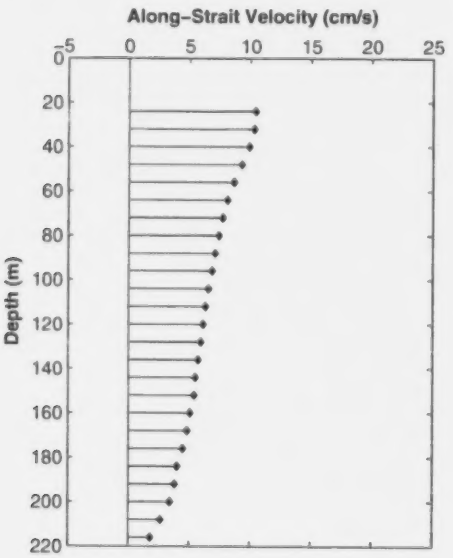
Figure 31: Mean Flows, August 4, 2004 to August 4, 2005.

South side of Barrow Strait





South-Central Barrow Strait



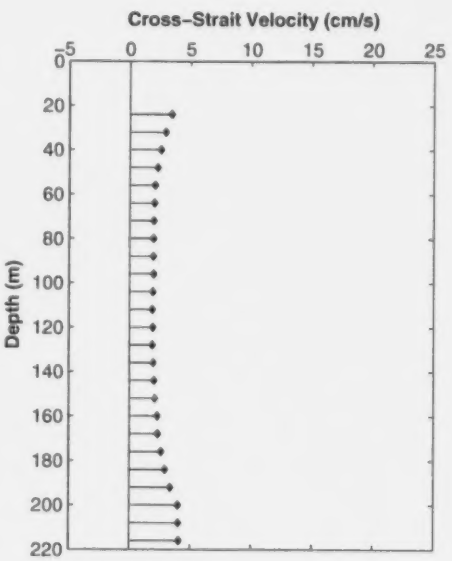
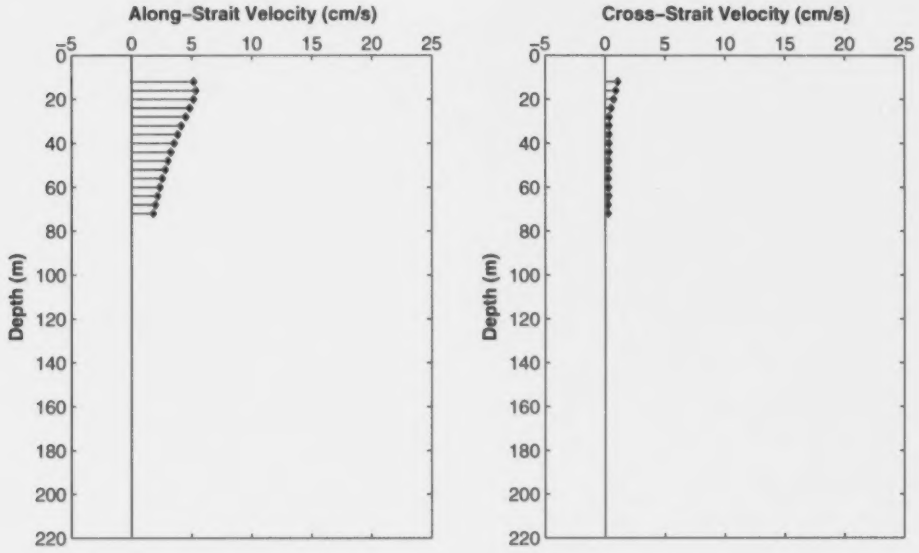


Figure 31: Mean Flows, August 3, 2004 to August 6, 2005. (continued)

Central Barrow Strait



North side of Barrow Strait

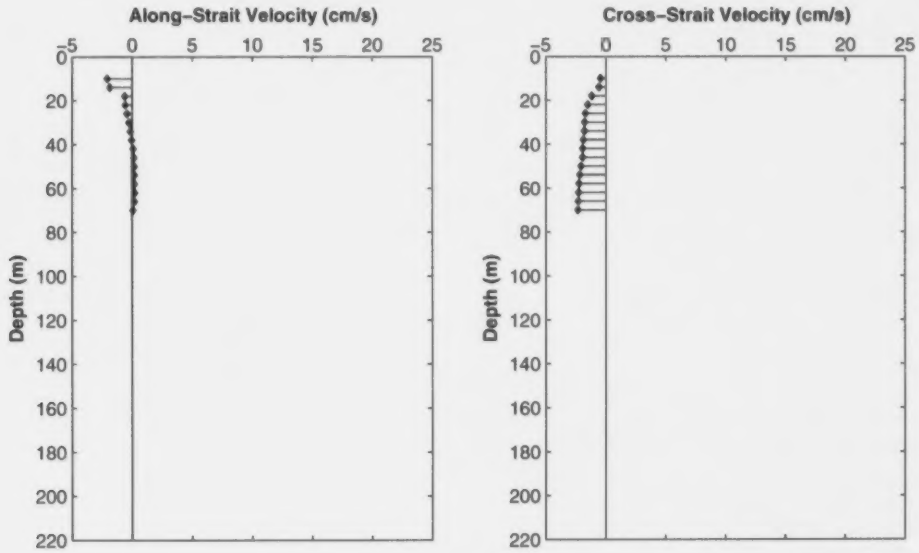
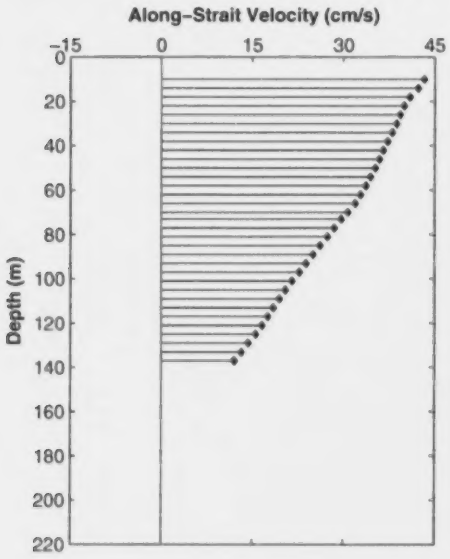
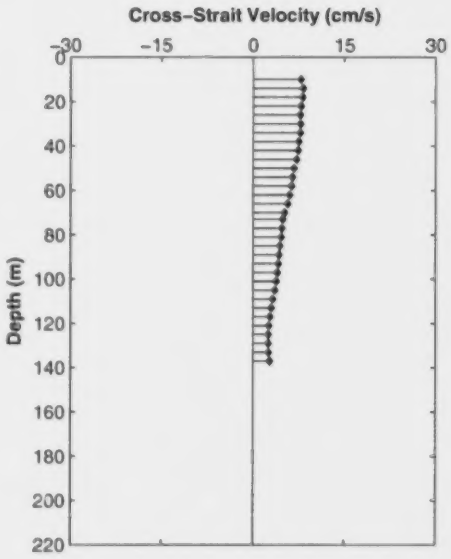


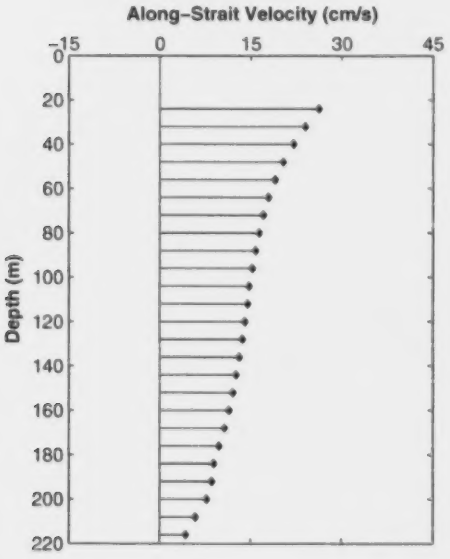
Figure 32: Mean Flows, Late Summer: Aug. 2004 to Sep. 2004.

South side of Barrow Strait





South-Central Barrow Strait



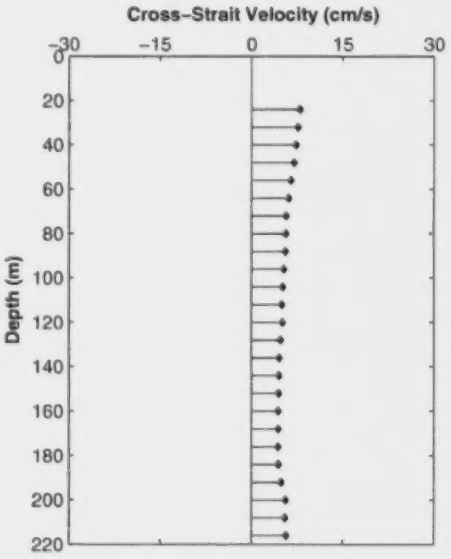


Figure 32: Mean Flows, Late Summer: Aug. 2004 to Sep. 2004 (continued)

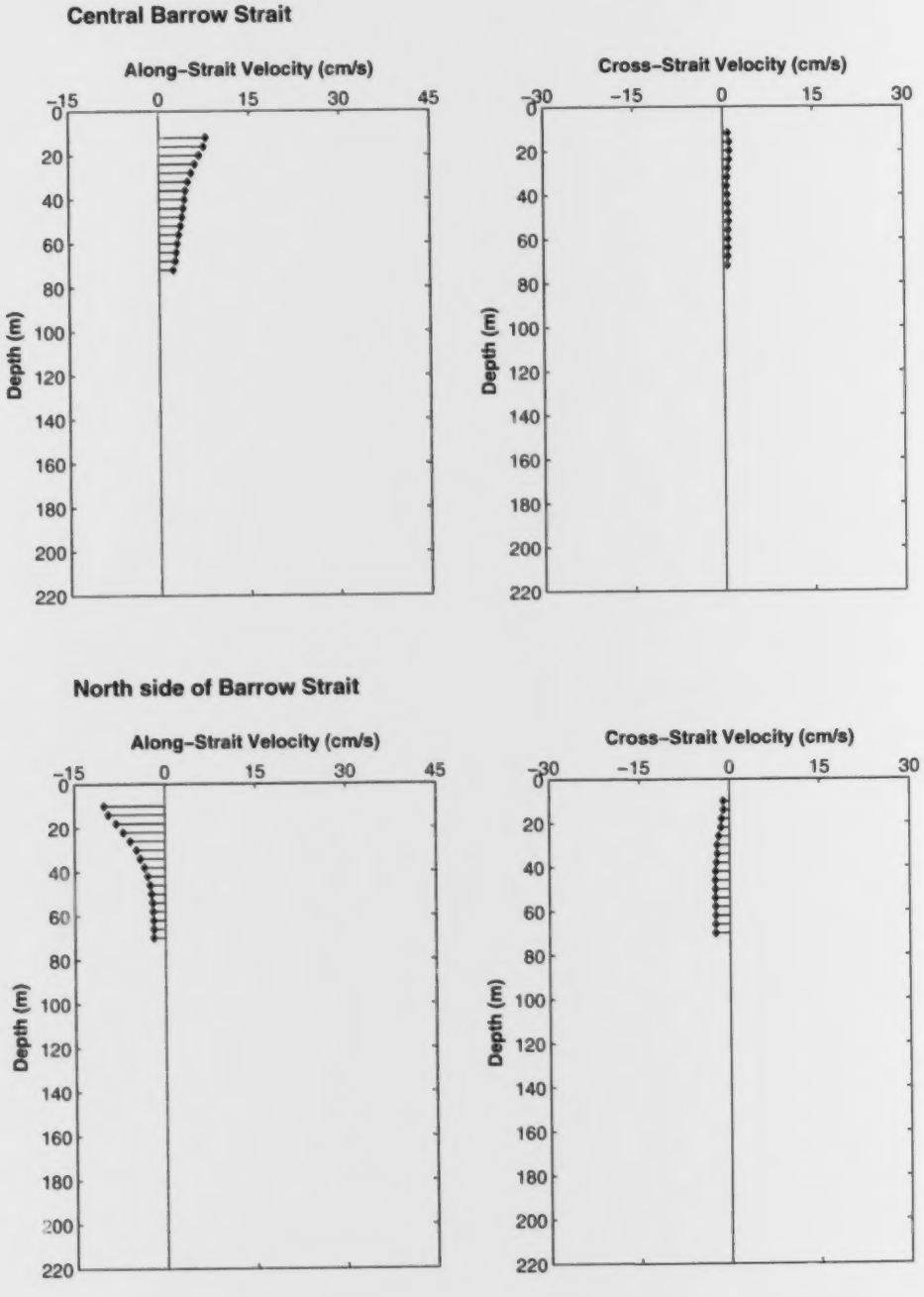
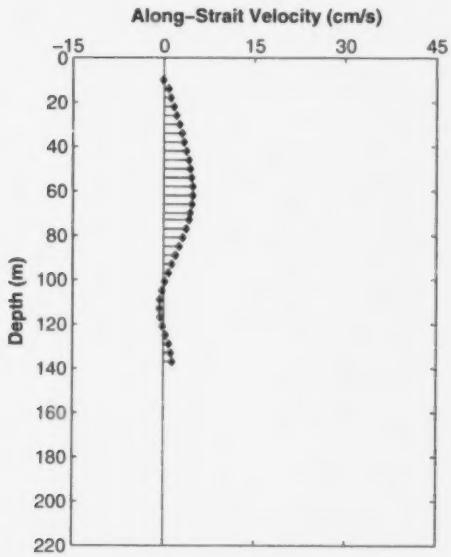
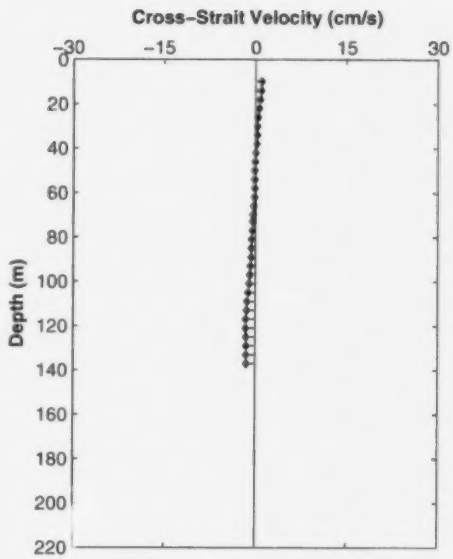


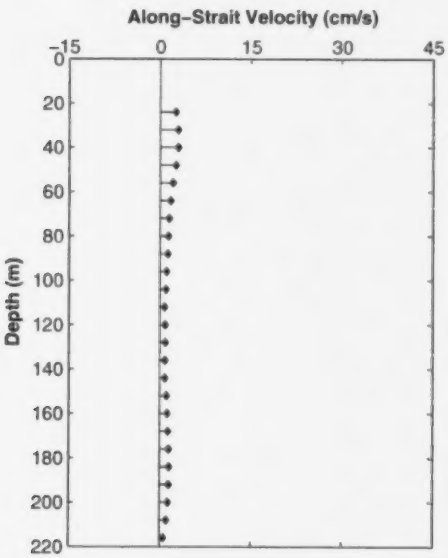
Figure 33: Mean Flows, Fall: Sep. 2004 to Dec. 2004.

South side of Barrow Strait





South-Central Barrow Strait



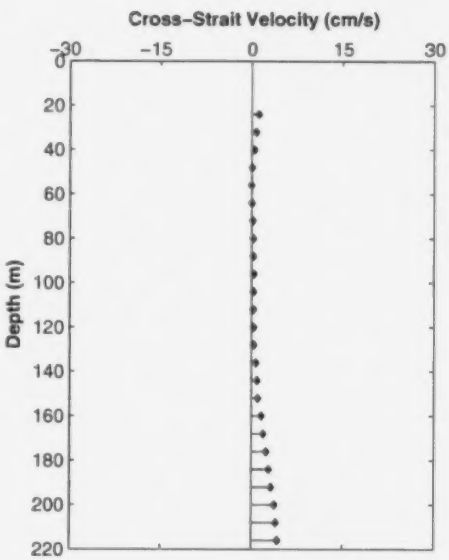


Figure 33: Mean Flows, Fall: Sep. 2004 to Dec. 2004 (continued).

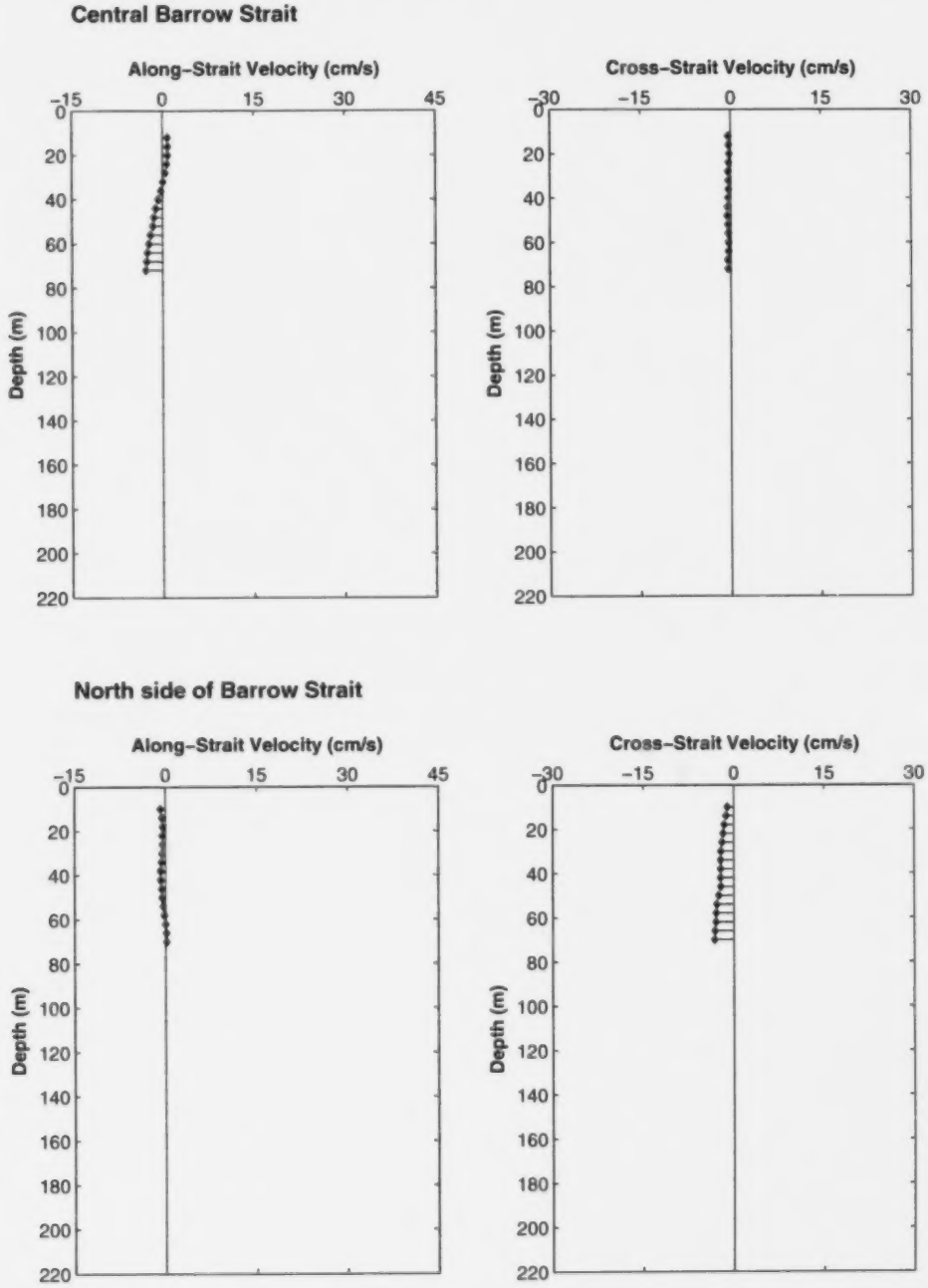
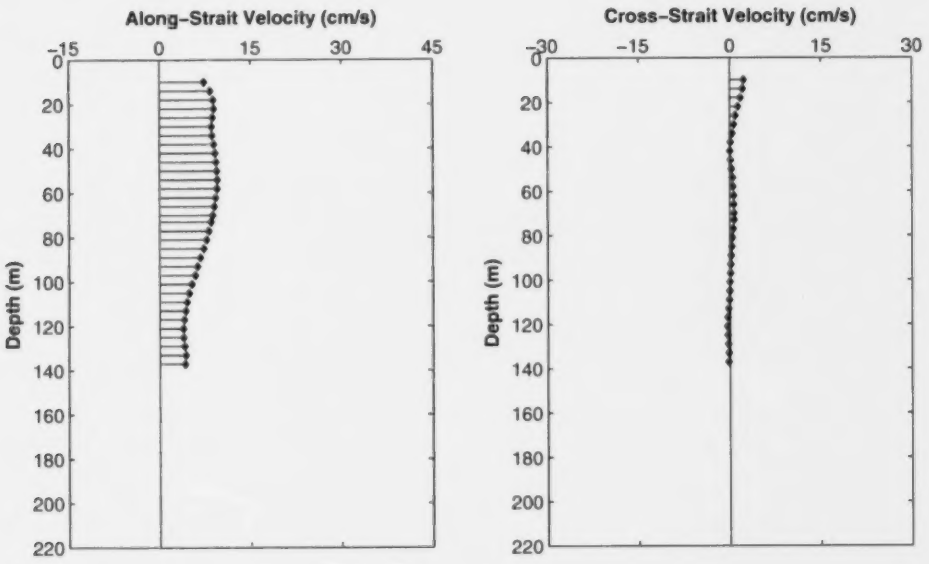


Figure 34: Mean Flows, Winter: Dec. 2004 to Mar. 2005.

South side of Barrow Strait



South-Central Barrow Strait

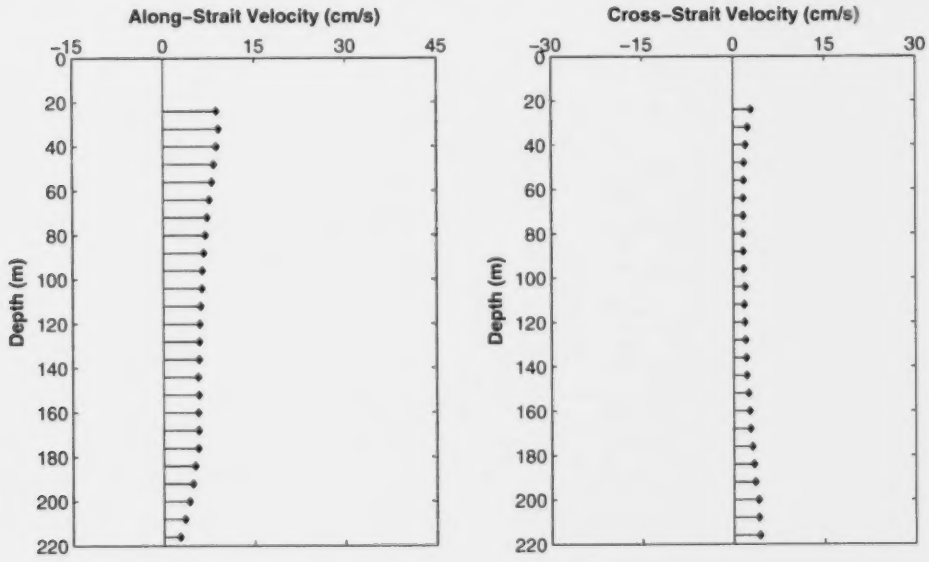


Figure 34: Mean Flows, Winter: Dec. 2004 to Mar. 2005 (continued).

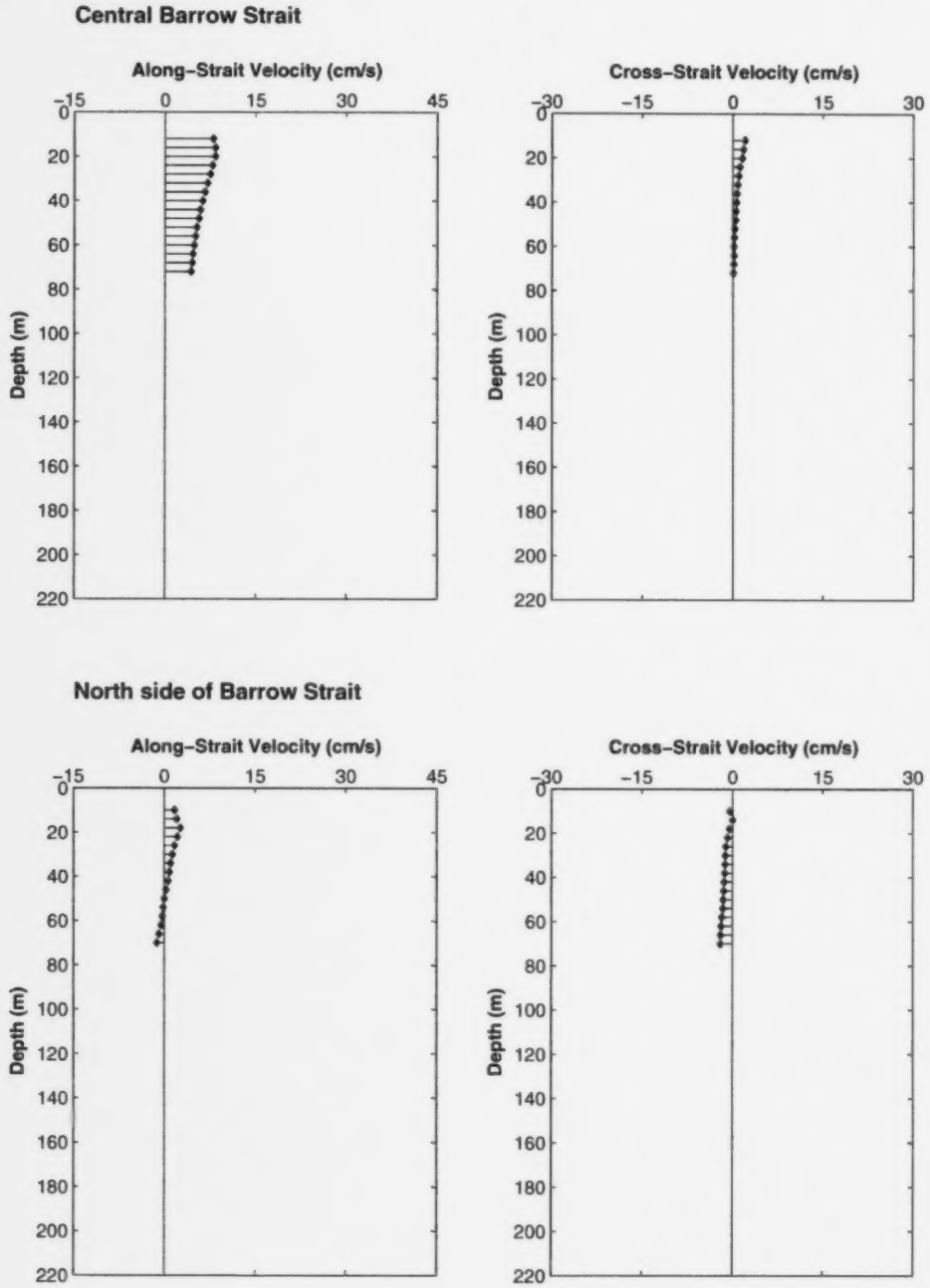
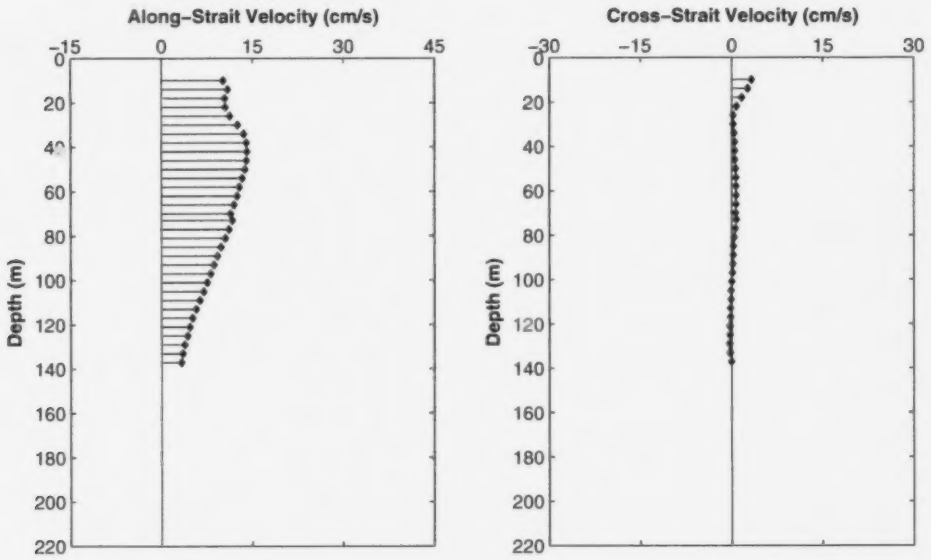


Figure 35: Mean Flows, Spring: Mar. 2005 to Jun. 2005.

South side of Barrow Strait



South-Central Barrow Strait

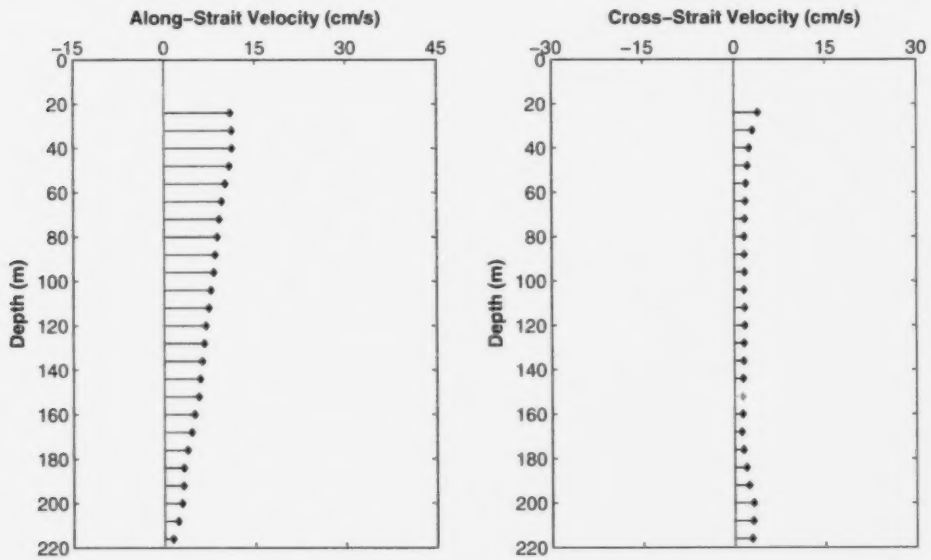


Figure 35: Mean Flows, Spring: Mar. 2005 to Jun. 2005 (continued).

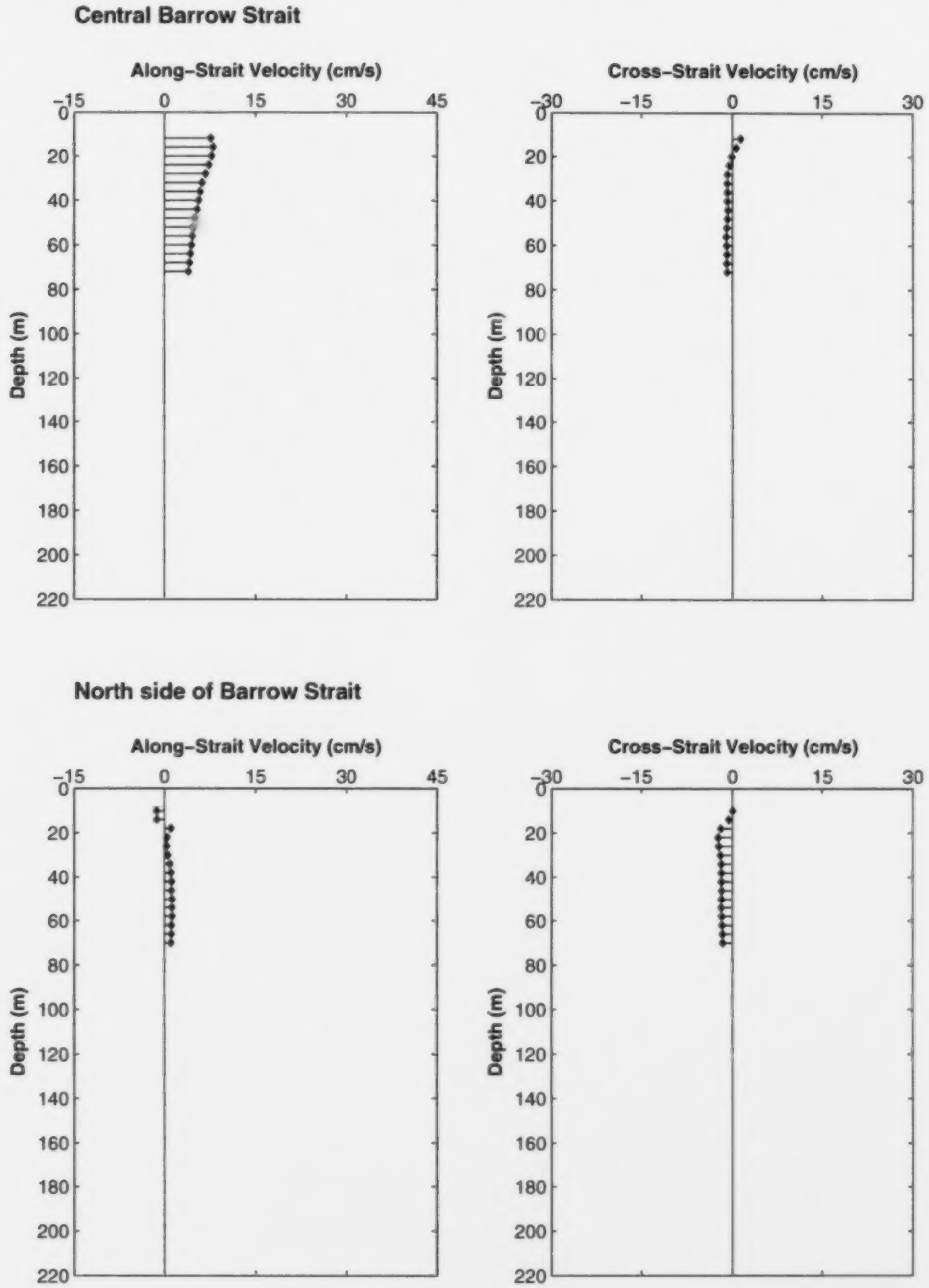


Figure 36: Mean Flows, Early Summer: Jun. 2005 to Aug. 2005.

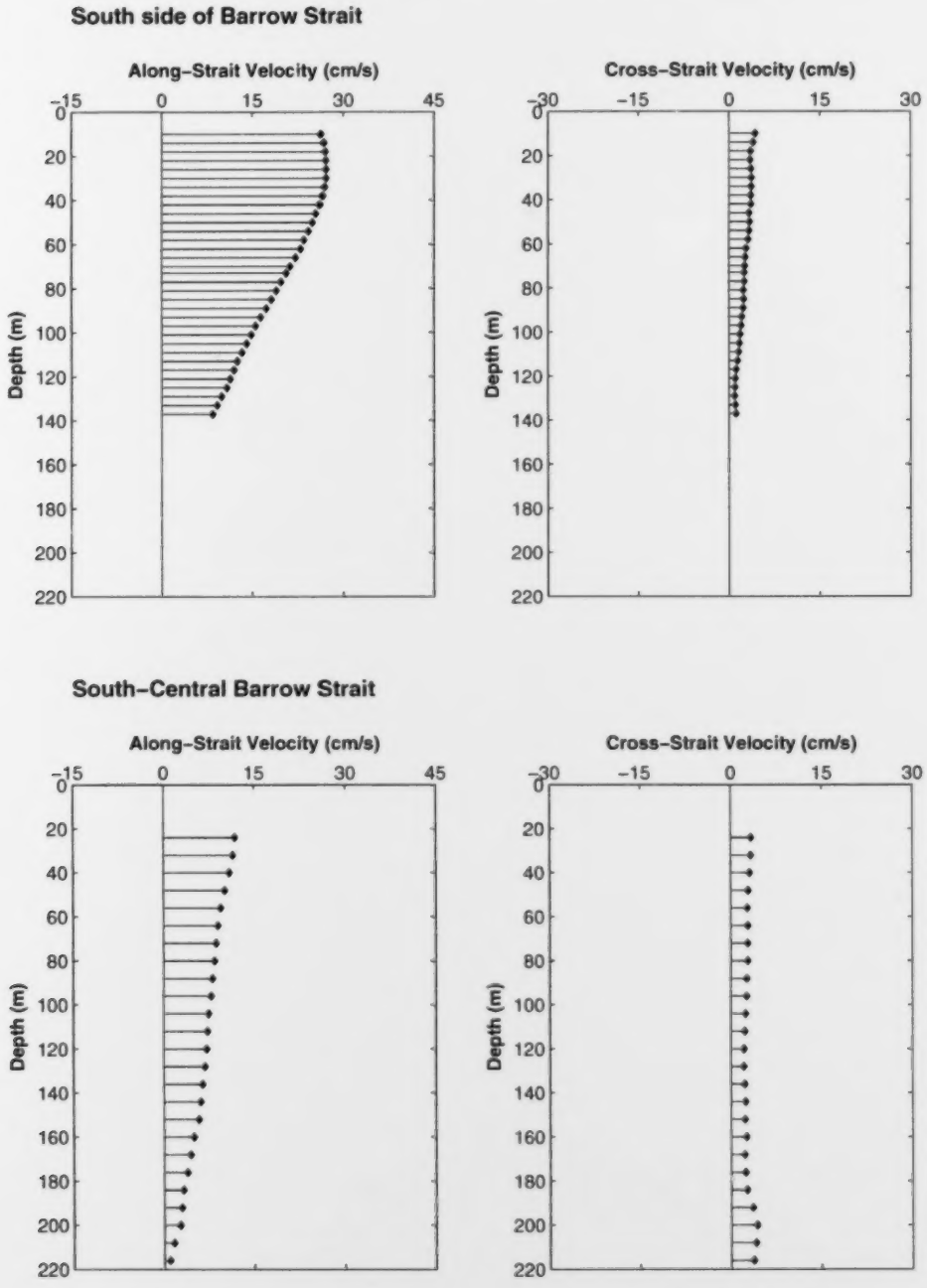


Figure 36: Mean Flows, Early Summer: Jun. 2005 to Aug. 2005 (continued).

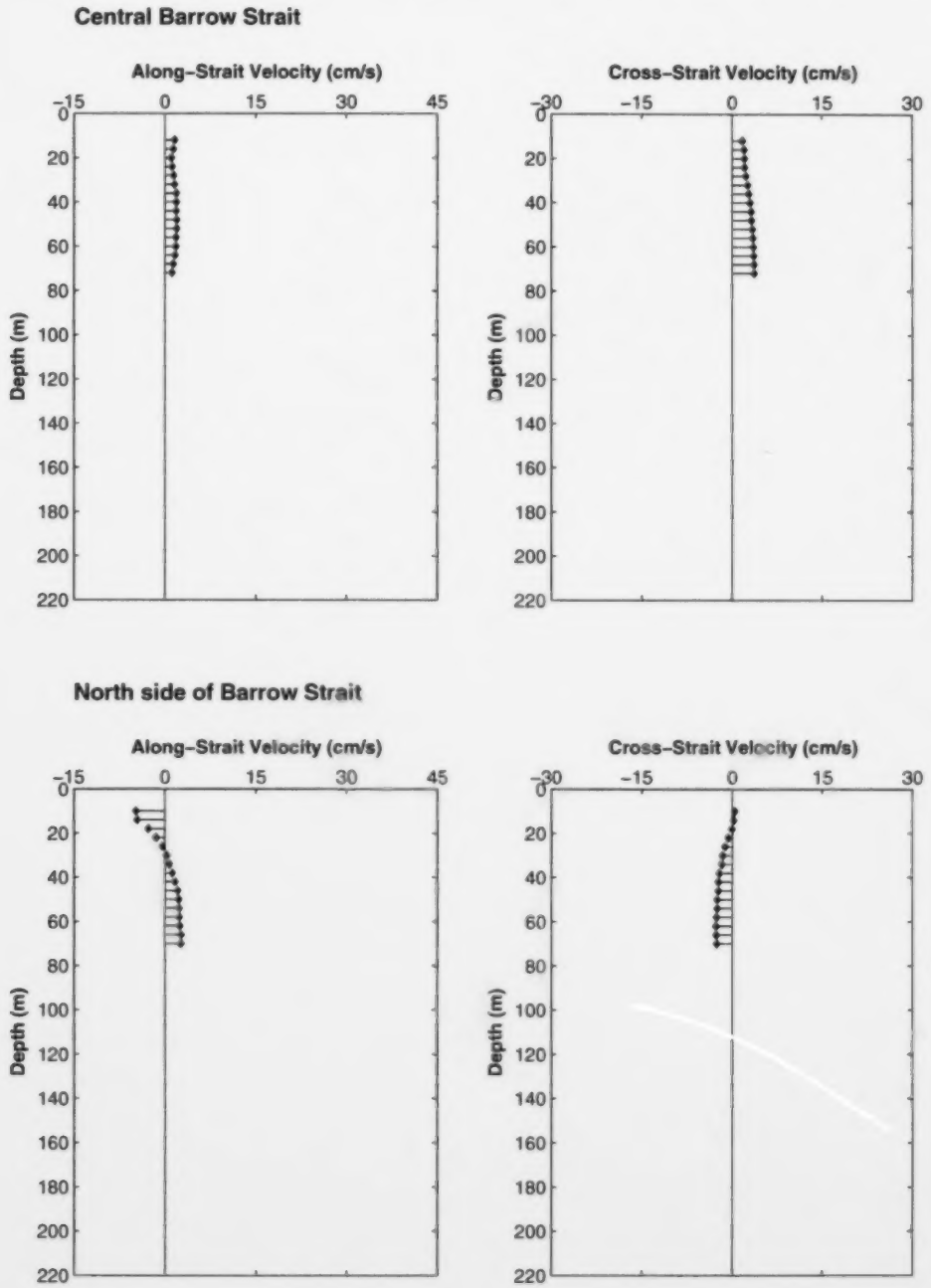


Figure 37: Variance in bihourly and low-pass filtered currents. August 2004 to August 2005.

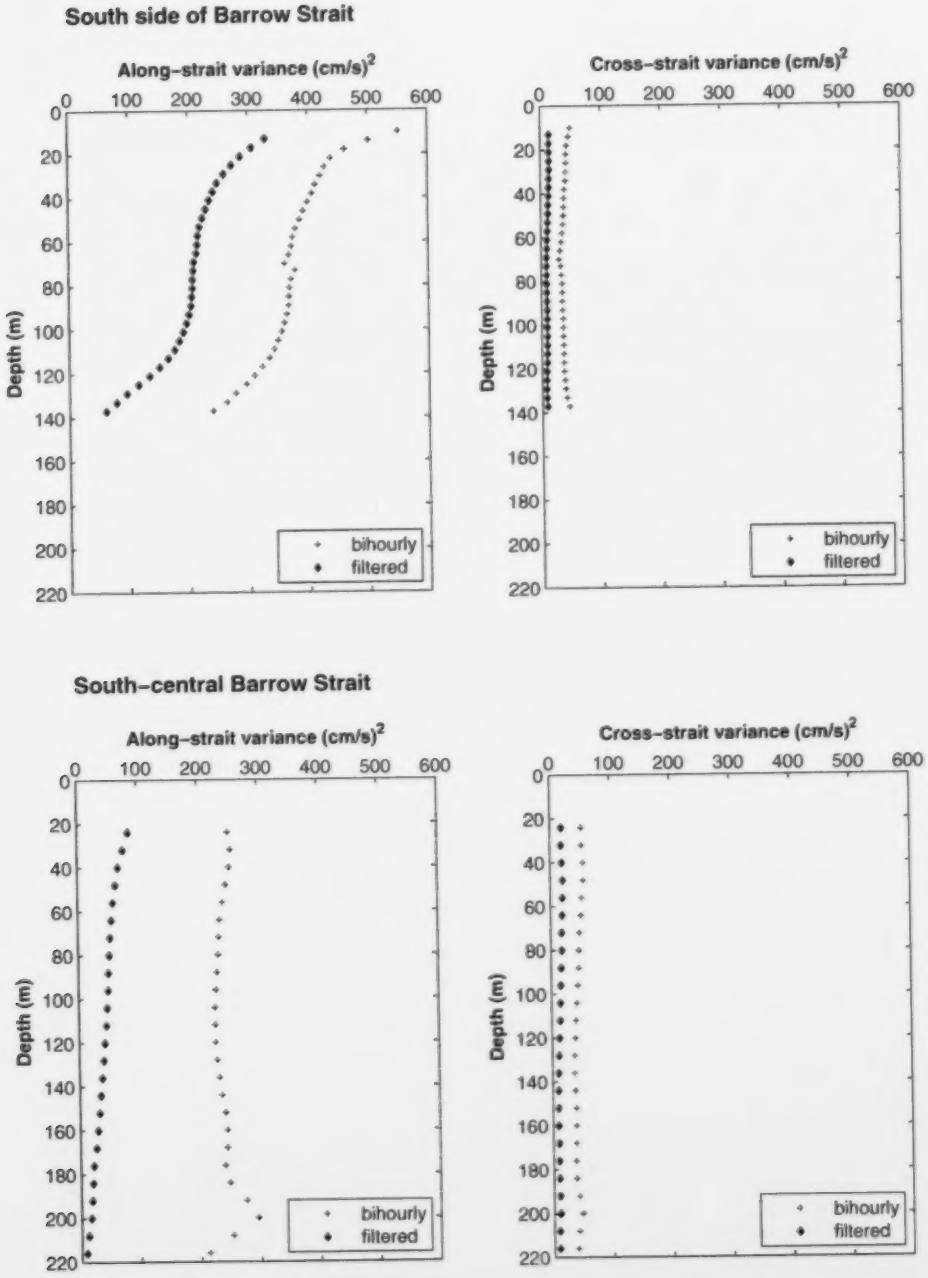
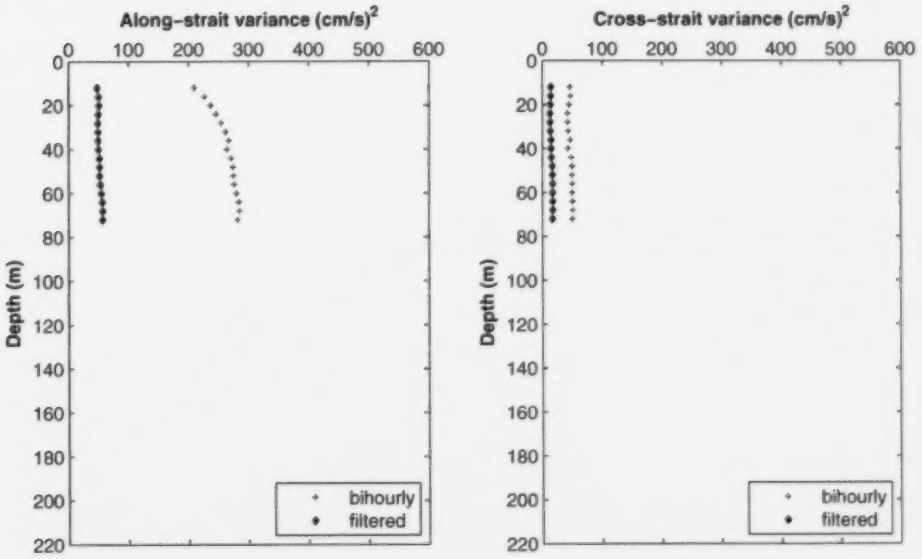


Figure 37: Variance in bihourly and low-pass filtered currents August 2004 to August 2005 (continued).

Central Barrow Strait


Along-strait variance (cm/s)^2
Cross-strait variance (cm/s)^2
0 100 200 300 400 500 600
0 20 40 60 80 100 120 140 160 180 200 220
Depth (m)
bihourly
filtered

North side of Barrow Strait

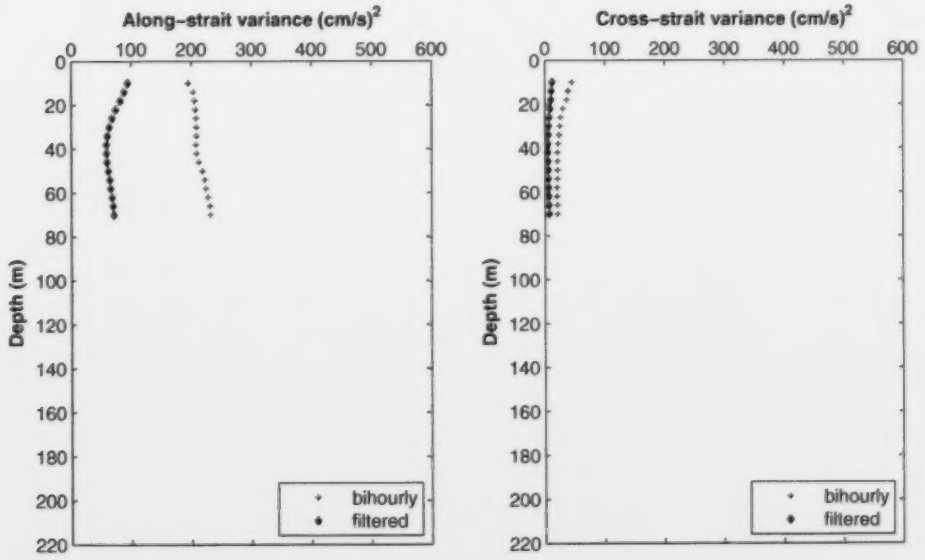
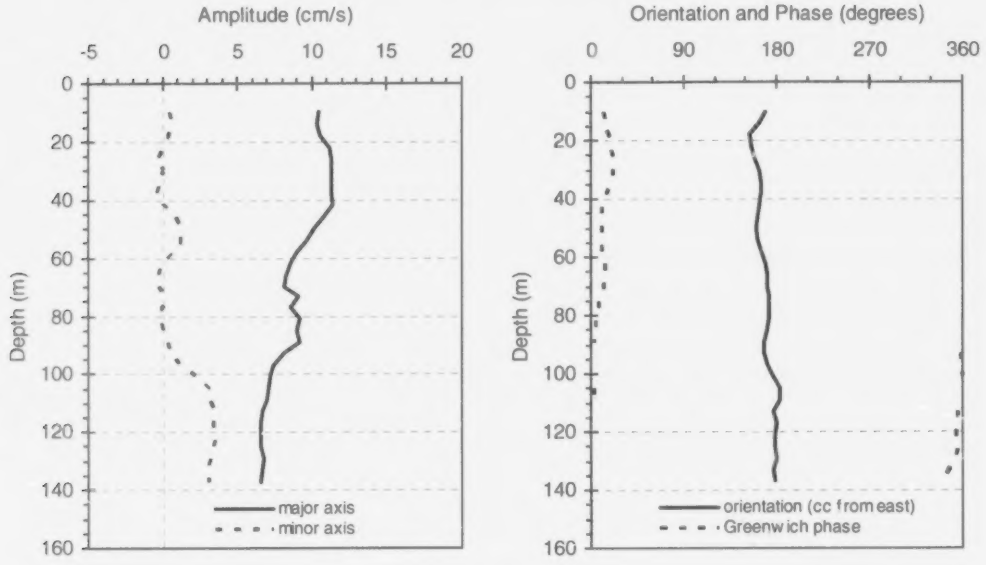

Along-strait variance (cm/s)^2
Cross-strait variance (cm/s)^2
0 100 200 300 400 500 600
0 20 40 60 80 100 120 140 160 180 200 220
Depth (m)
bihourly
filtered

Figure 38 – K1 Tidal Constituent, South Side of Barrow Strait

For Ice Free Period (Aug. 04, 2004 to Sep. 25, 2004):



For Solid Ice Period (Feb. 12, 2005 to Jul 1, 2005):

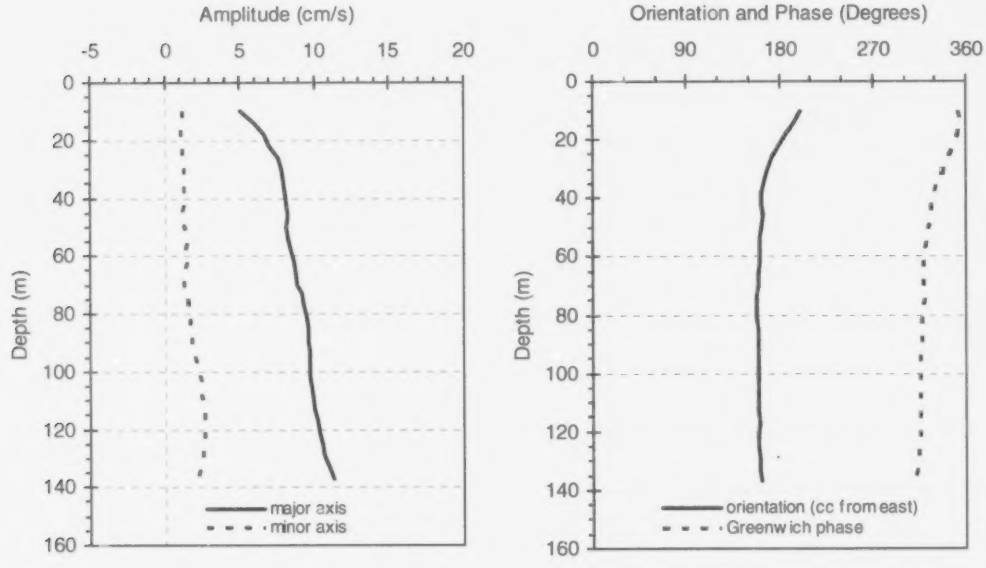
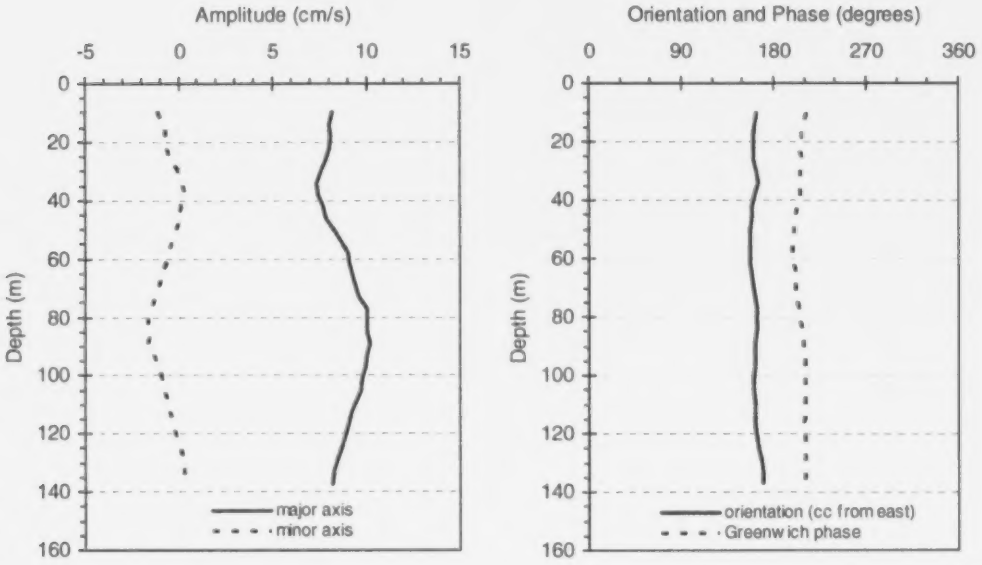


Figure 39 – M2 Tidal Constituent, South Side of Barrow Strait

For Ice Free Period (Aug. 04, 2004 to Sep. 25, 2004):



For Solid Ice Period (Feb. 12, 2005 to Jul. 1, 2005):

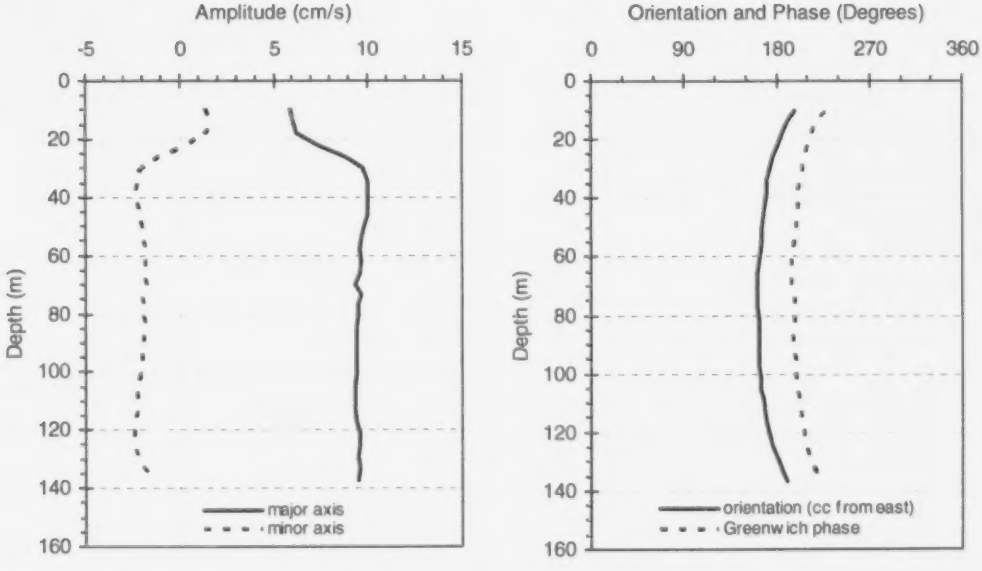
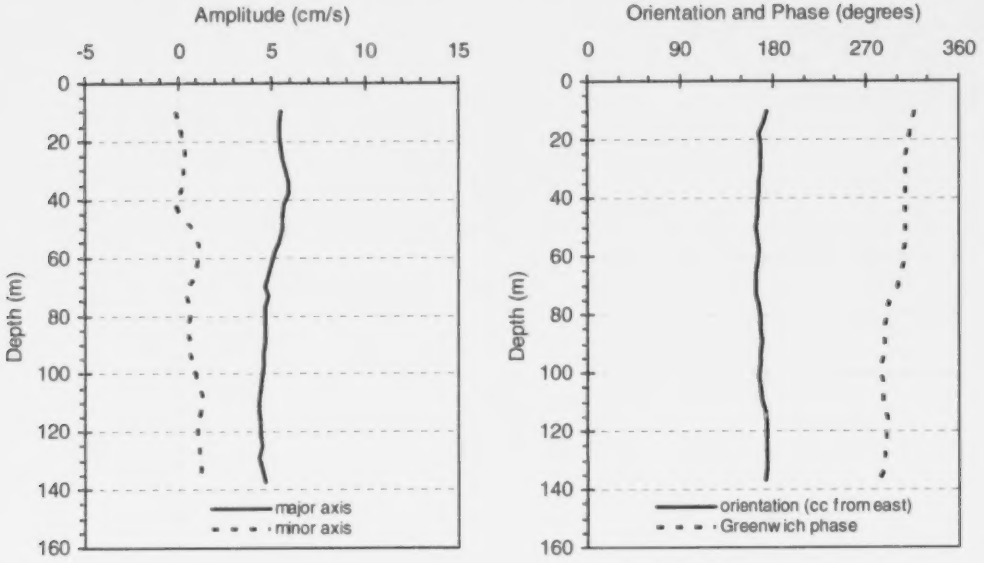


Figure 40 – O1 Tidal Constituent, South Side of Barrow Strait

For Ice Free Period (Aug. 04, 2004 to Sep. 25, 2004):



For Solid Ice Period (Feb. 12, 2005 to Jul. 1, 2005):

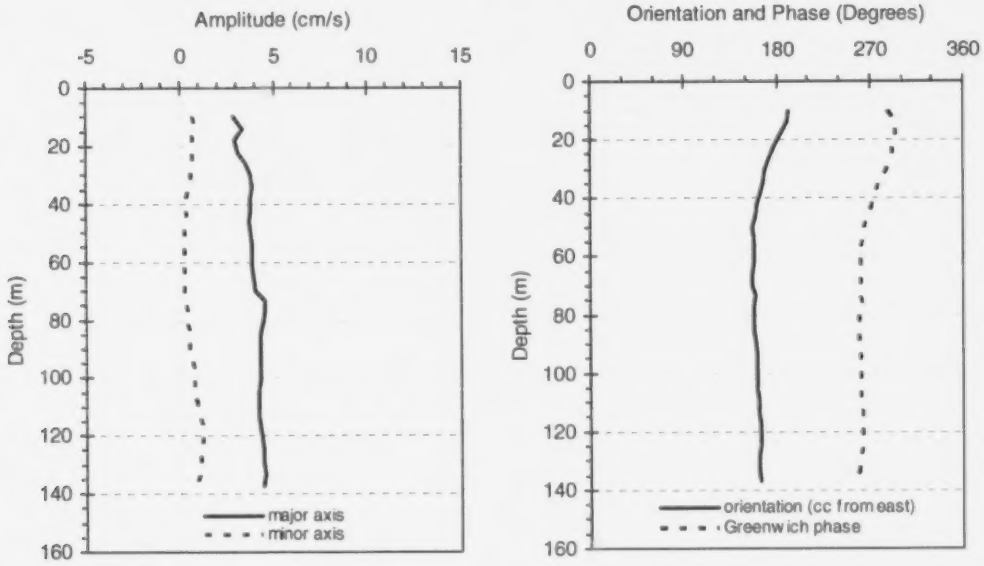
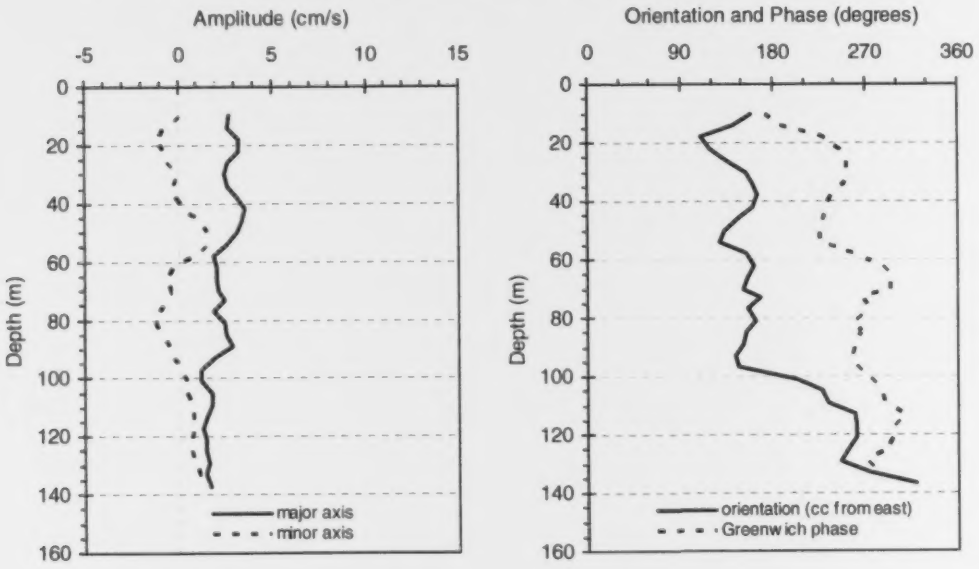


Figure 41 – P1 Tidal Constituent, South Side of Barrow Strait

For Ice Free Period (Aug. 04, 2004 to Sep. 25, 2004):



For Solid Ice Period (Feb. 12, 2005 to Jul. 1, 2005):

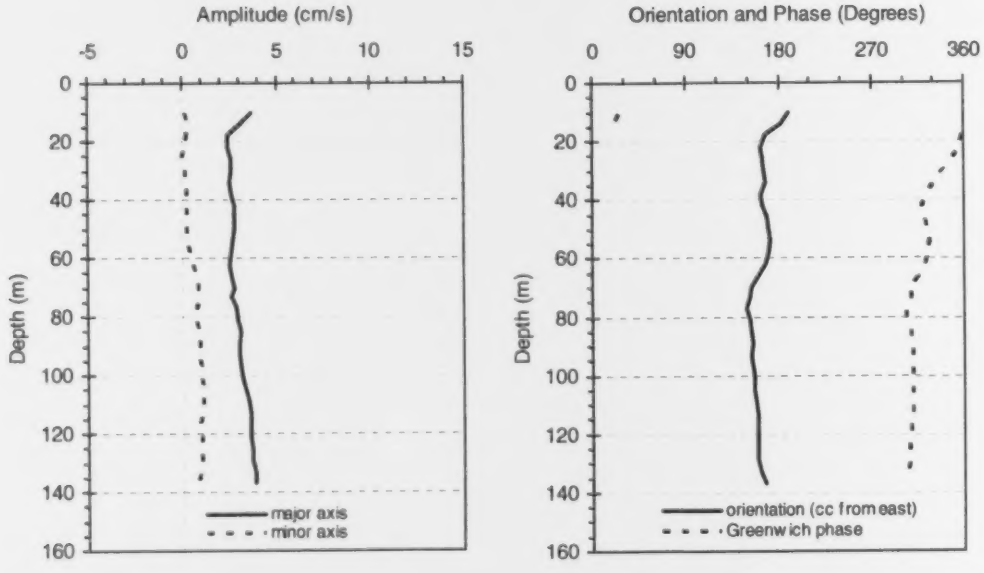
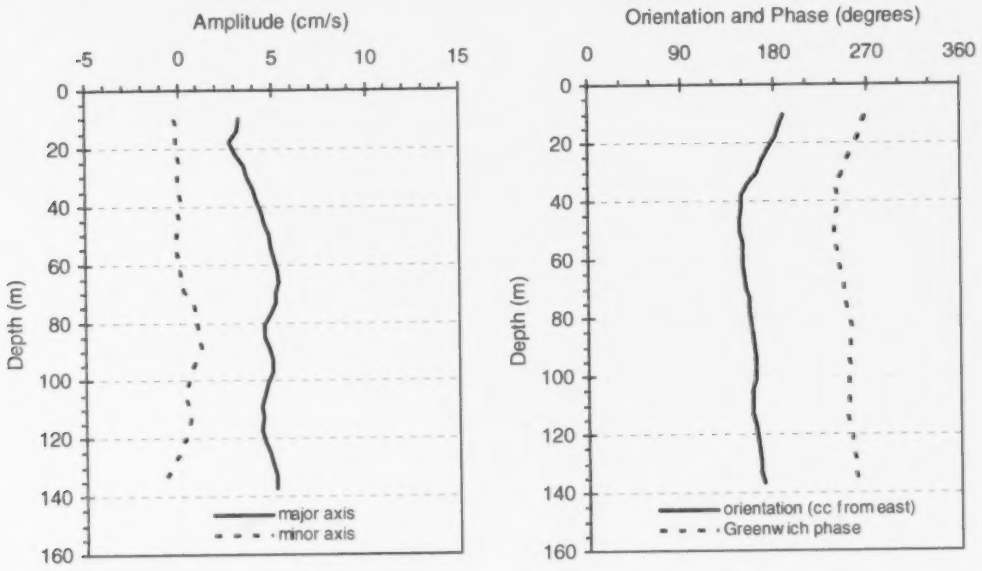


Figure 42 – S2 Tidal Constituent, South Side of Barrow Strait

For Ice Free Period (Aug. 04, 2004 to Sep. 25, 2004):



For Solid Ice Period (Feb. 12, 2005 to Jul. 1, 2005):

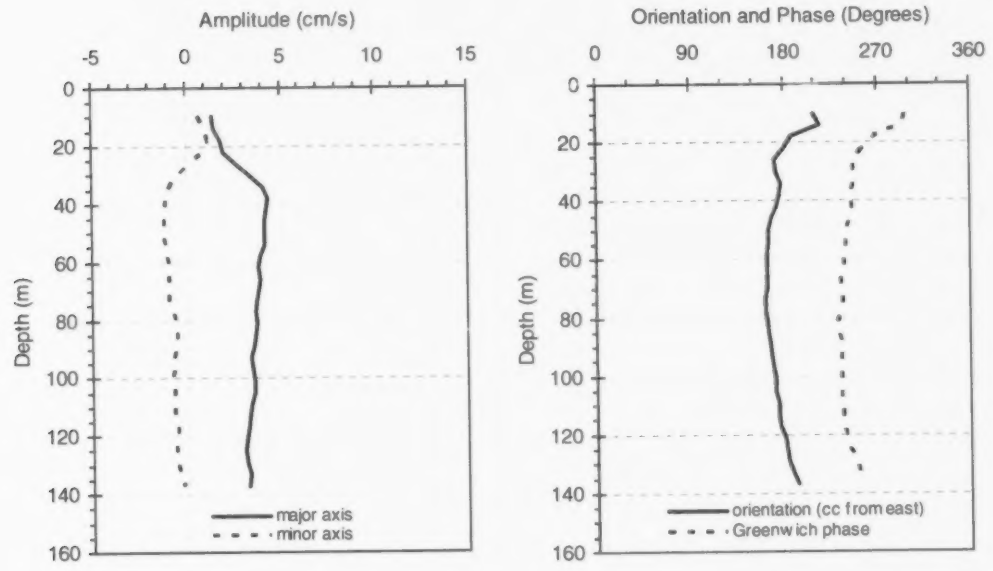
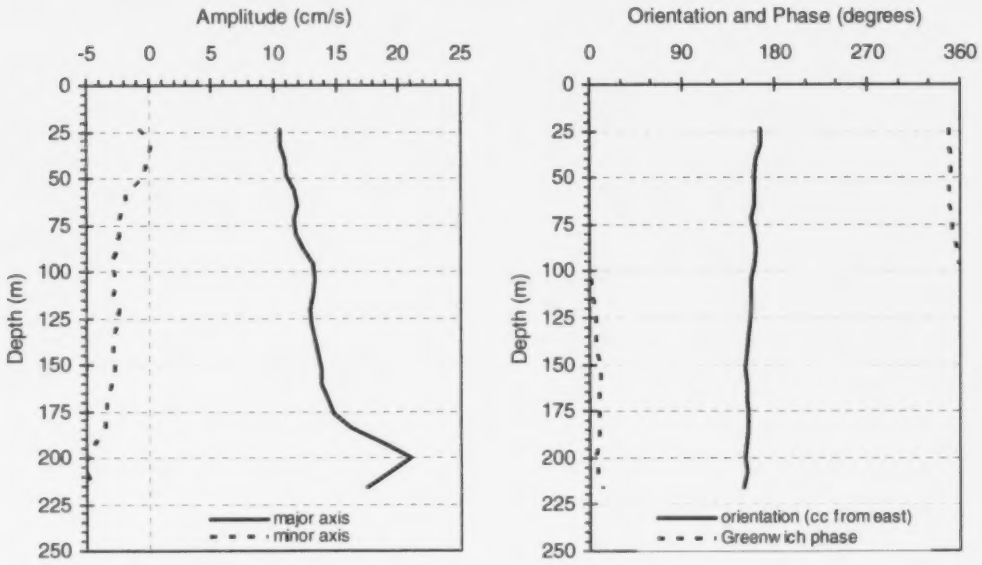


Figure 43 - K1 Tidal Constituent, South Central Barrow Strait

For Ice Free Period (Aug. 04, 2004 to Sep. 25, 2004):


Amplitude (cm/s)
-5 0 5 10 15 20 25
Depth (m)
0 25 50 75 100 125 150 175 200 225 250
major axis
minor axis
Orientation and Phase (degrees)
0 90 180 270 360
Depth (m)
0 25 50 75 100 125 150 175 200 225 250
orientation (cc from east)
Greenwich phase

For Solid Ice Period (Feb. 12, 2005 to Jul 1, 2005):

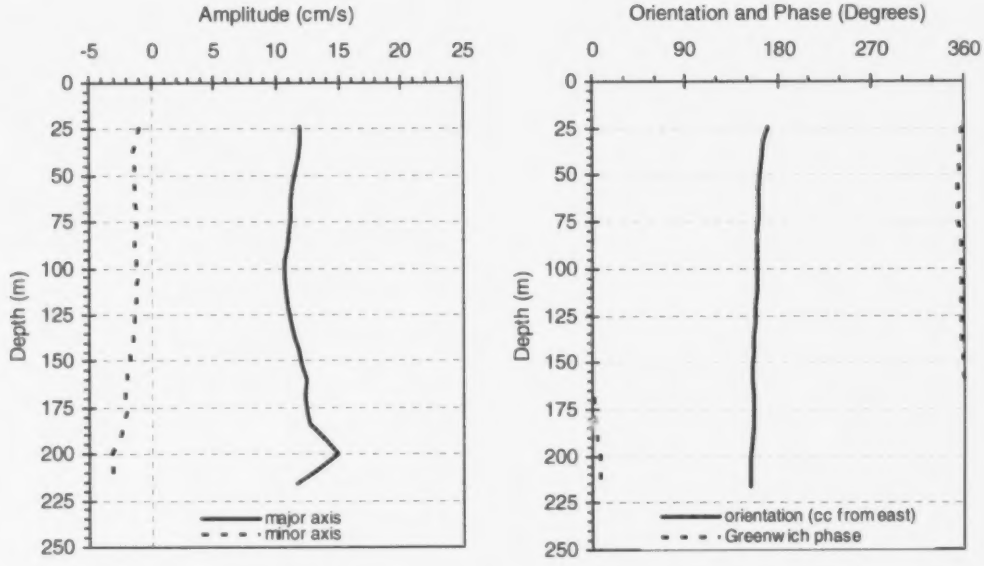
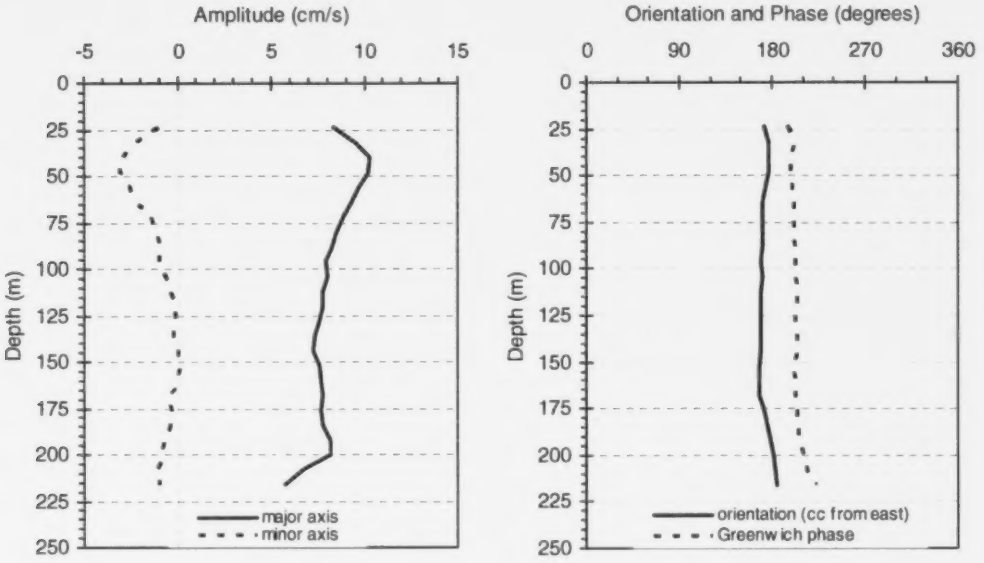

Amplitude (cm/s)
-5 0 5 10 15 20 25
Depth (m)
0 25 50 75 100 125 150 175 200 225 250
major axis
minor axis
Orientation and Phase (Degrees)
0 90 180 270 360
Depth (m)
0 25 50 75 100 125 150 175 200 225 250
orientation (cc from east)
Greenwich phase

Figure 44 – M2 Tidal Constituent, South Central Barrow Strait

For Ice Free Period (Aug. 04, 2004 to Sep. 25, 2004):



For Solid Ice Period (Feb. 12, 2005 to Jul. 1, 2005):

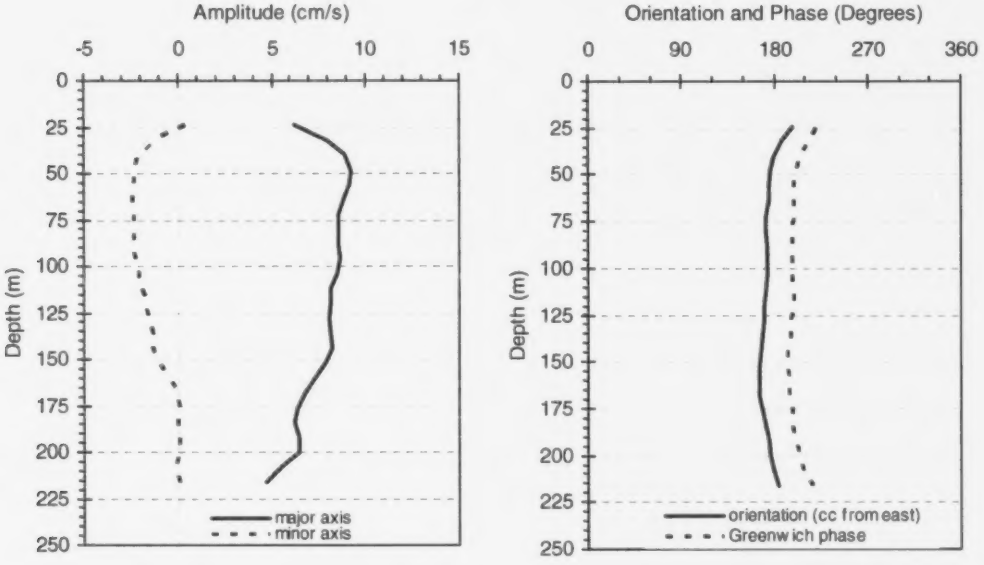
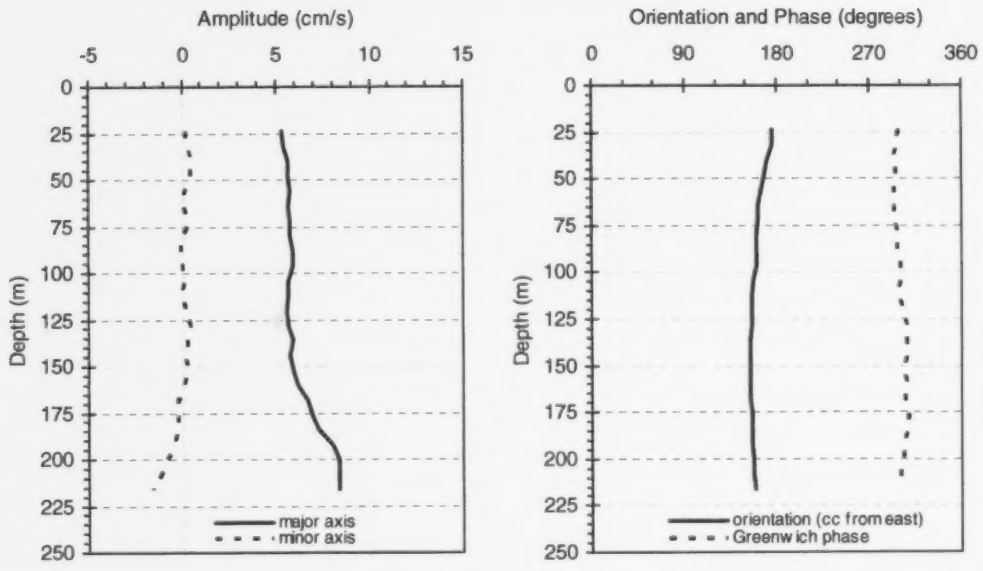


Figure 45 – O1 Tidal Constituent, South Central Barrow Strait

For Ice Free Period (Aug. 04, 2004 to Sep. 25, 2004):



For Solid Ice Period (Feb. 12, 2005 to Jul. 1, 2005):

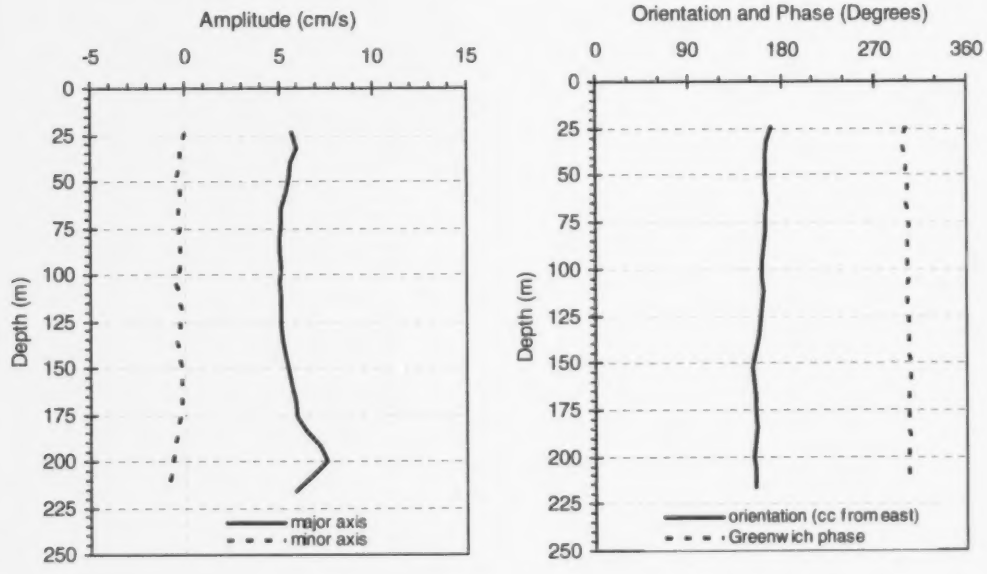
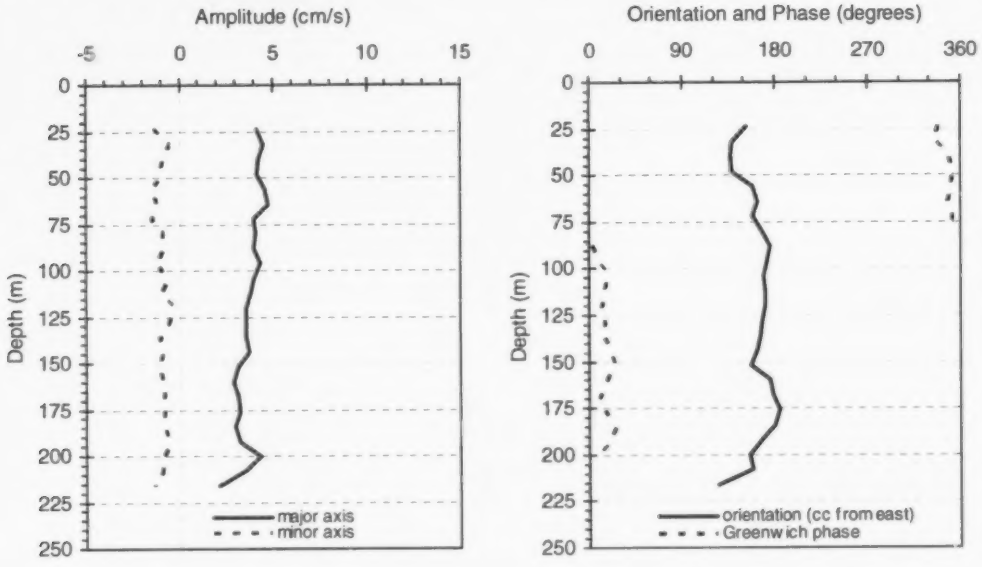


Figure 46 – P1 Tidal Constituent, South Central Barrow Strait

For Ice Free Period (Aug. 04, 2004 to Sep. 25, 2004):



For Solid Ice Period (Feb. 12, 2005 to Jul. 1, 2005):

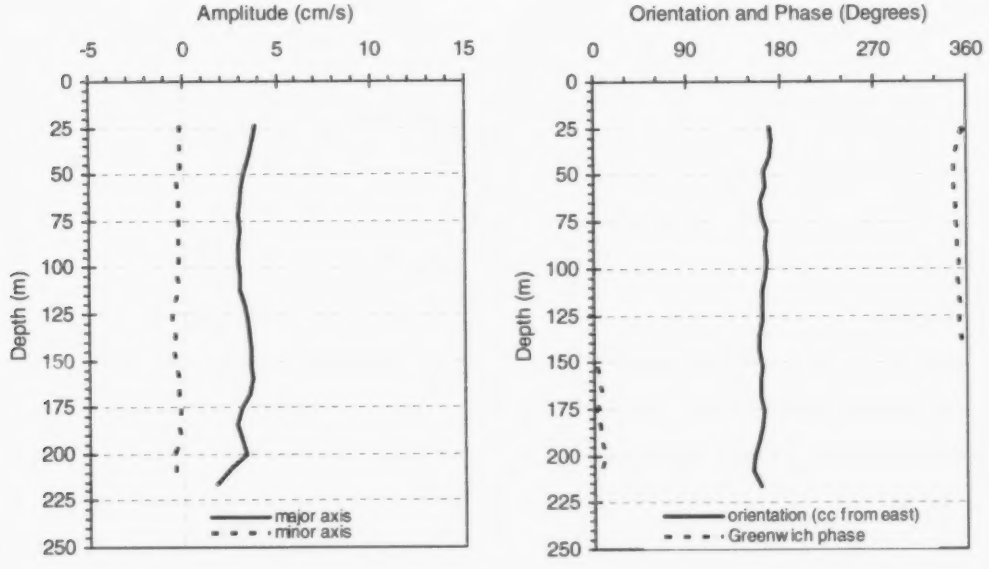
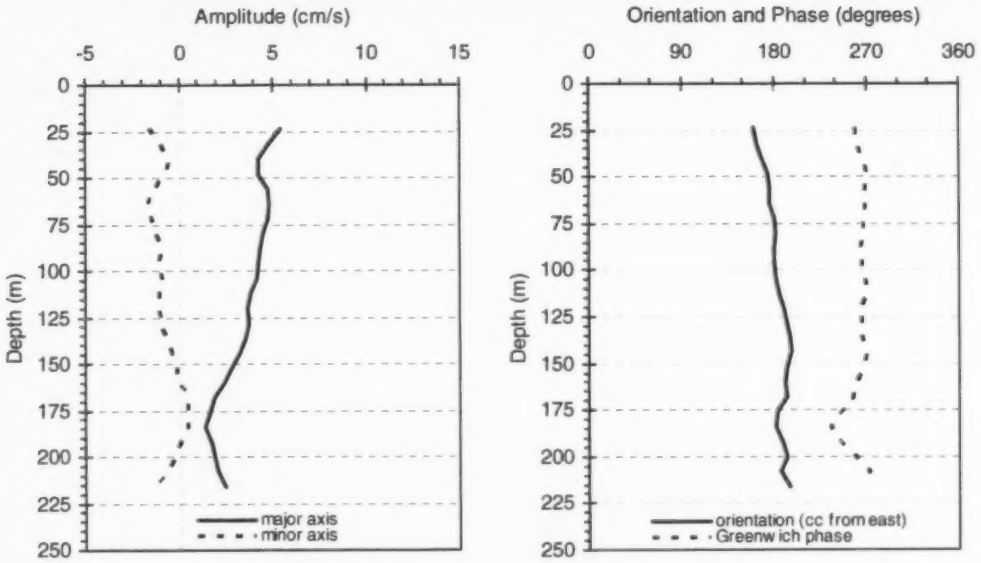


Figure 47 – S2 Tidal Constituent, South Central Barrow Strait

For Ice Free Period (Aug. 04, 2004 to Sep. 25, 2004):



For Solid Ice Period (Feb. 12, 2005 to Jul. 1, 2005):

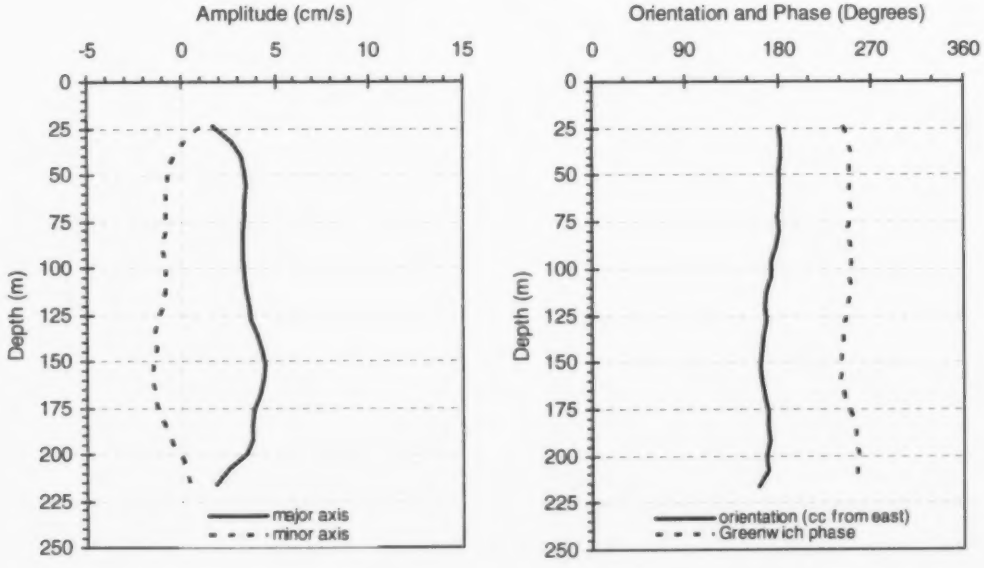
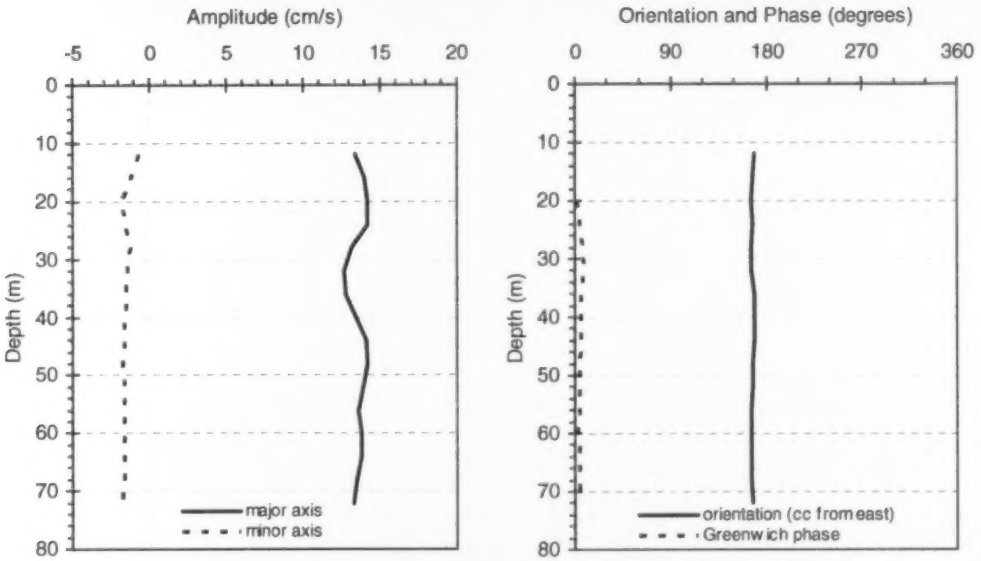


Figure 48 – K1 Tidal Constituent, Central Barrow Strait

For Ice Free Period (Aug. 03, 2004 to Sep. 24, 2004):



For Solid Ice Period (Feb. 14, 2005 to Jul. 3, 2005):

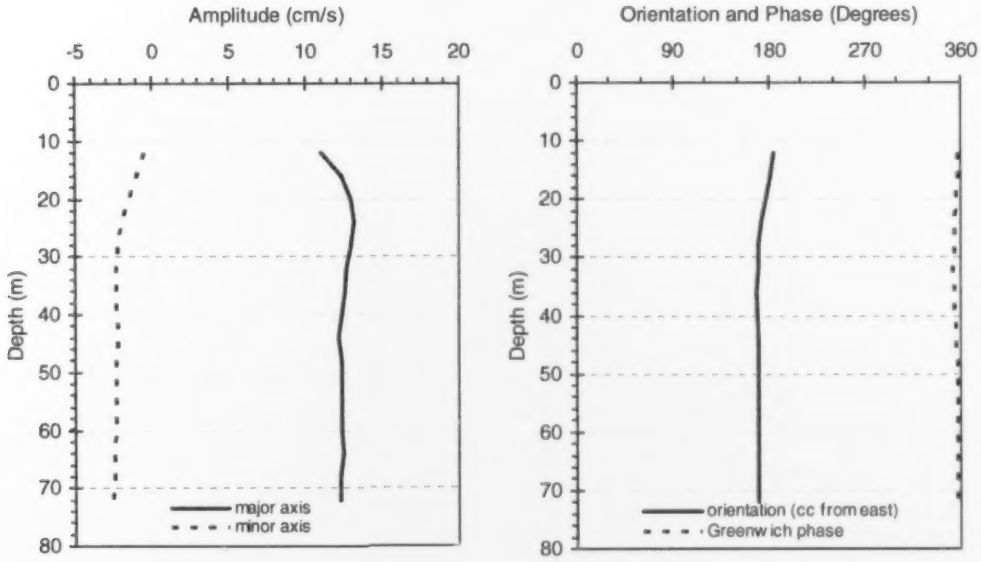
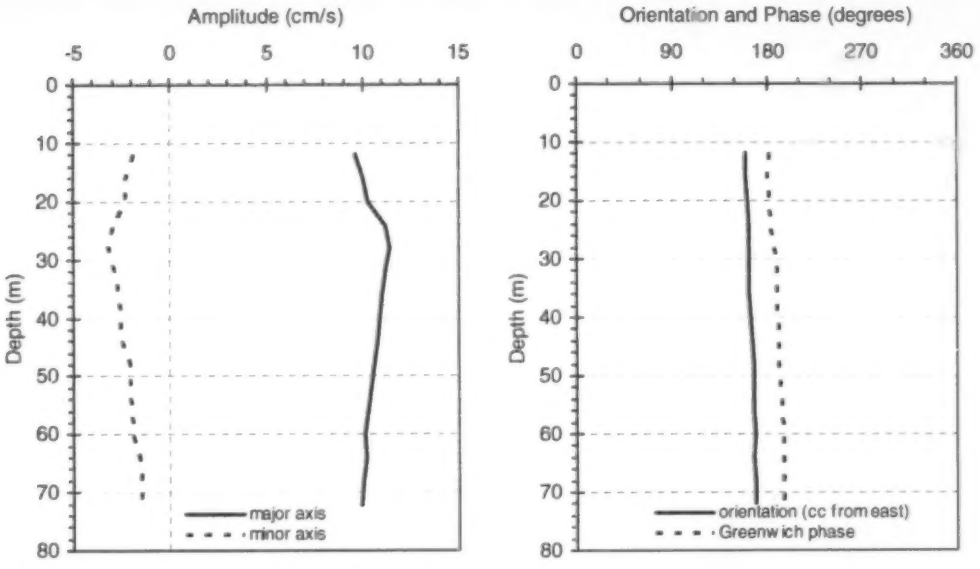


Figure 49 – M2 Tidal Constituent, Central Barrow Strait

For Ice Free Period (Aug. 03, 2004 to Sep. 24, 2004):



For Solid Ice Period (Feb. 14, 2005 to Jul. 3, 2005):

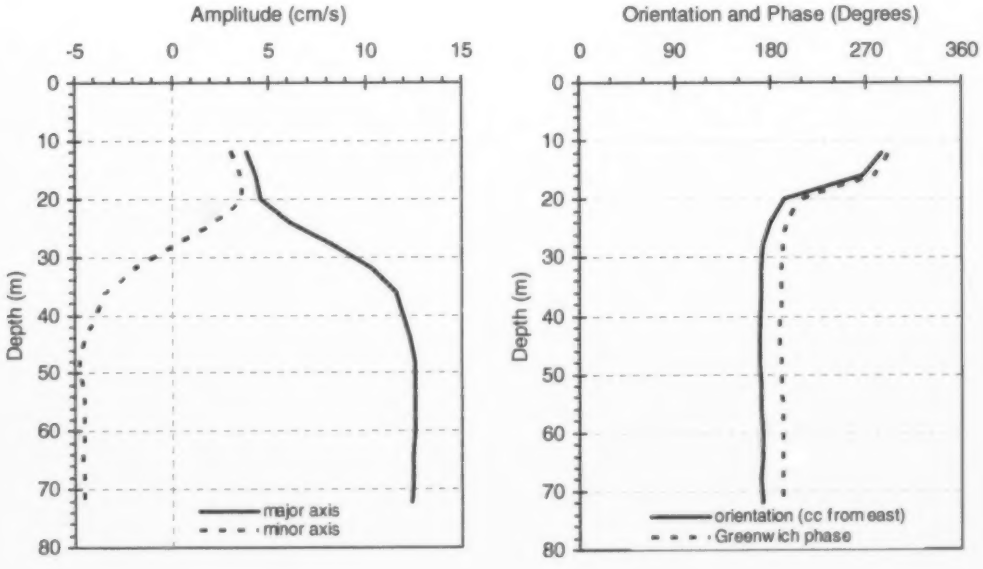
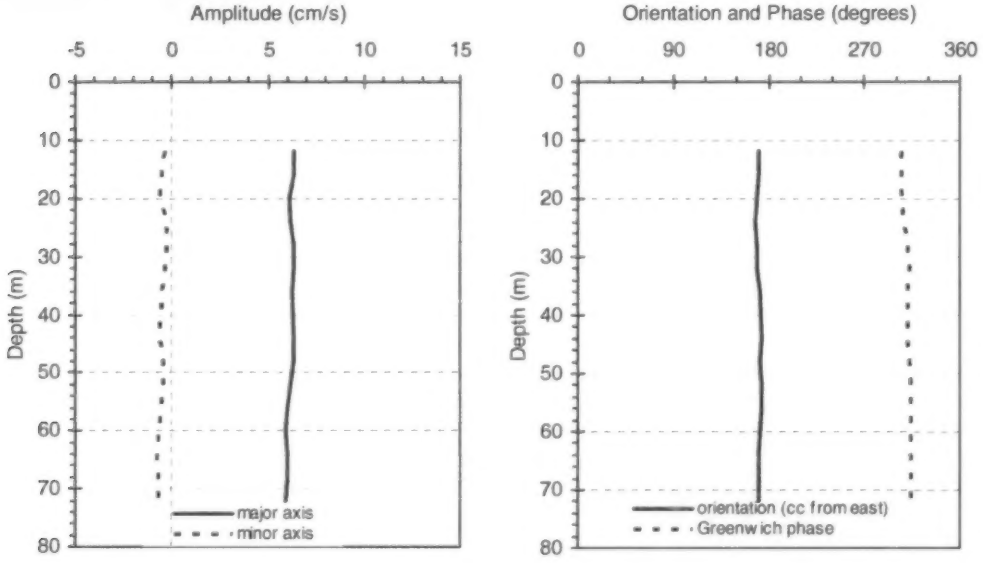


Figure 50 – O1 Tidal Constituent, Central Barrow Strait

For Ice Free Period (Aug. 03, 2004 to Sep. 24, 2004):



For Solid Ice Period (Feb. 14, 2005 to Jul. 3, 2005):

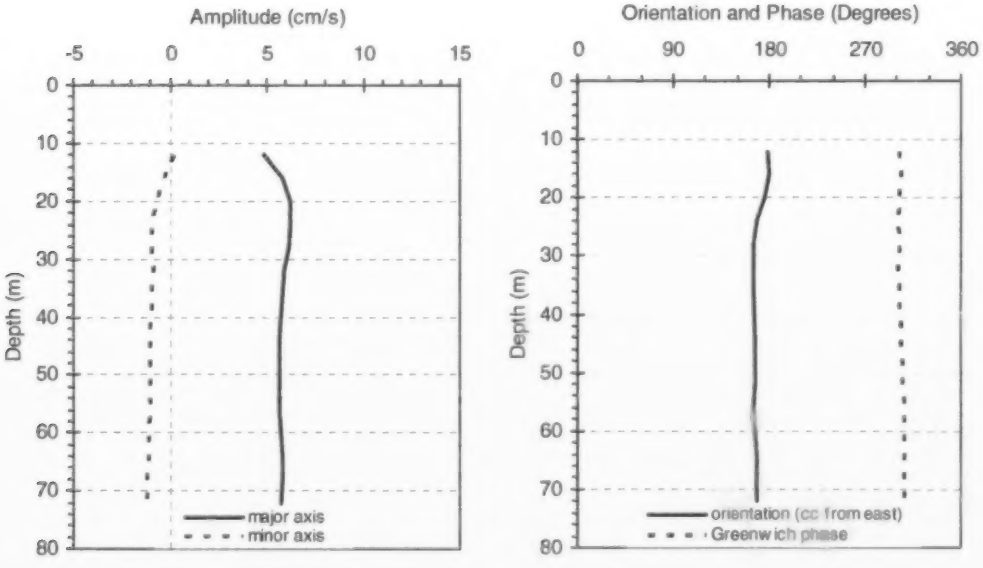
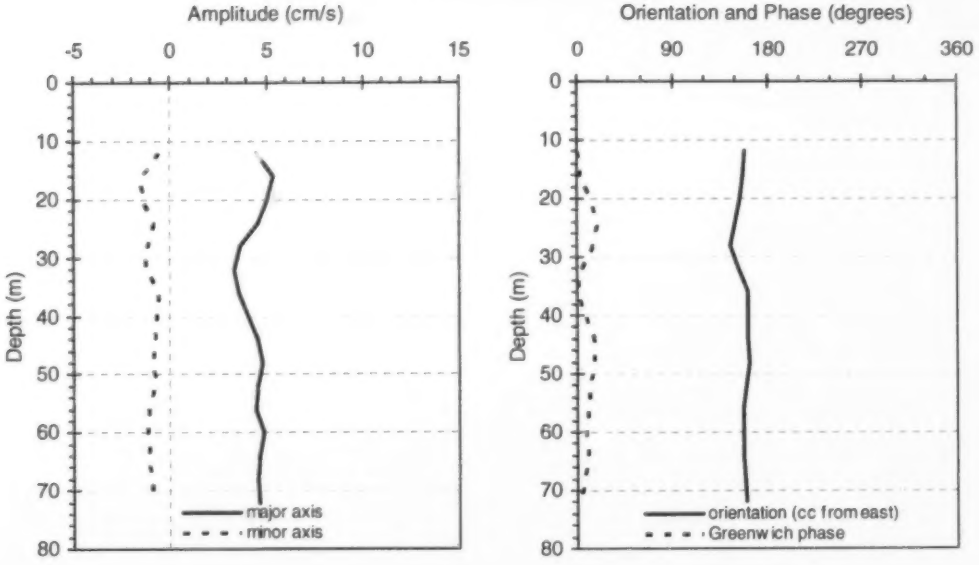


Figure 51 – P1 Tidal Constituent, Central Barrow Strait

For Ice Free Period (Aug. 03, 2004 to Sep. 24, 2004):



For Solid Ice Period (Feb. 14, 2005 to Jul. 3, 2005):

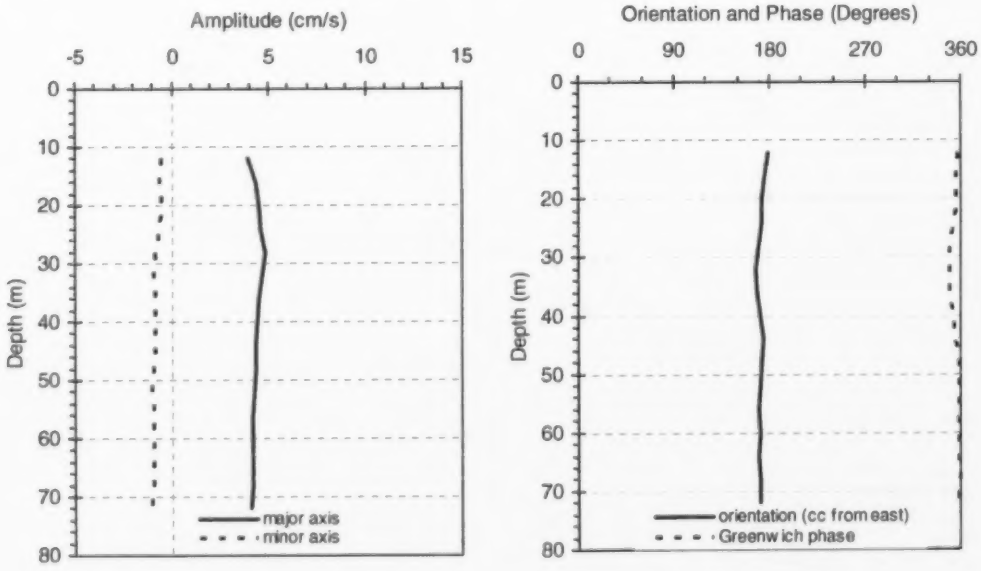
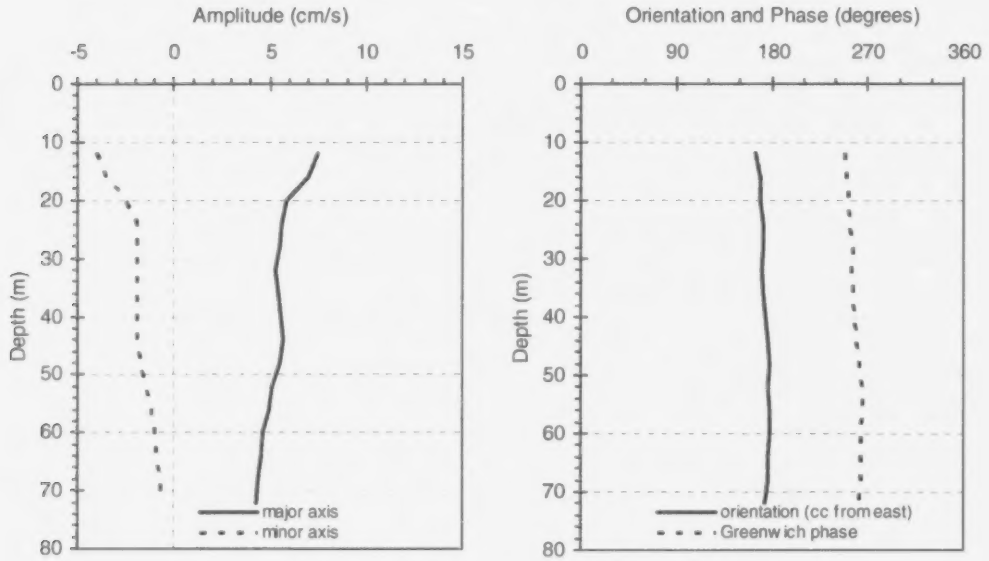


Figure 52 – S2 Tidal Constituent, Central Barrow Strait

For Ice Free Period (Aug. 03, 2004 to Sep. 24, 2004):



For Solid Ice Period (Feb. 14, 2005 to Jul. 3, 2005):

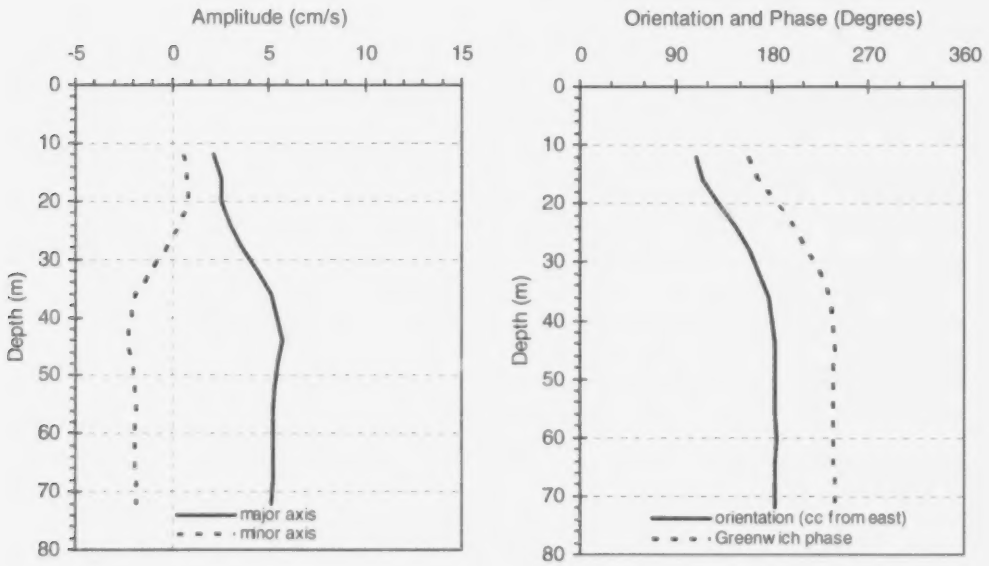
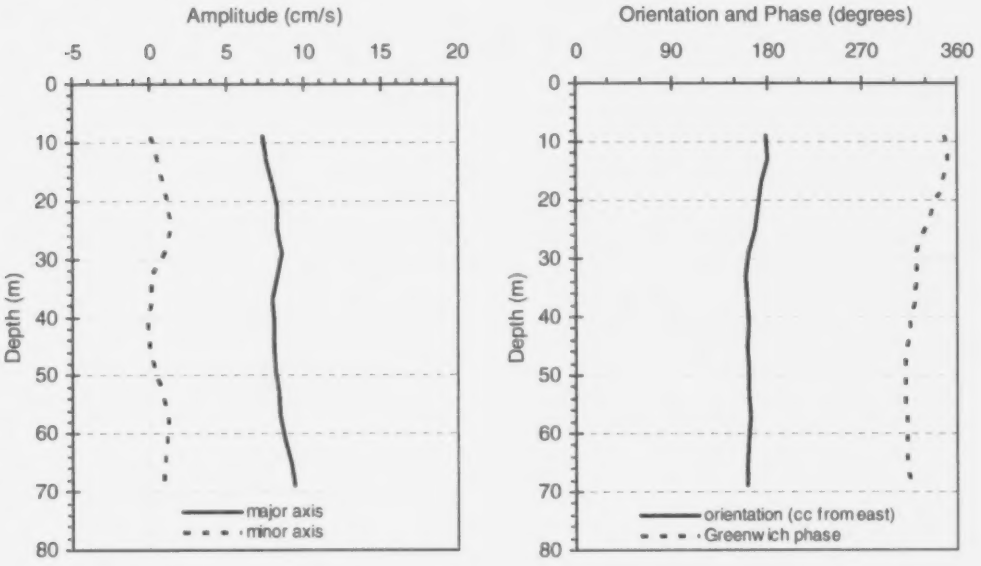


Figure 53 – K1 Tidal Constituent, North Side of Barrow Strait

For Ice Free Period (Aug. 03, 2004 to Sep. 30, 2004):



For Solid Ice Period (Feb. 14, 2005 to Jul. 3, 2005):

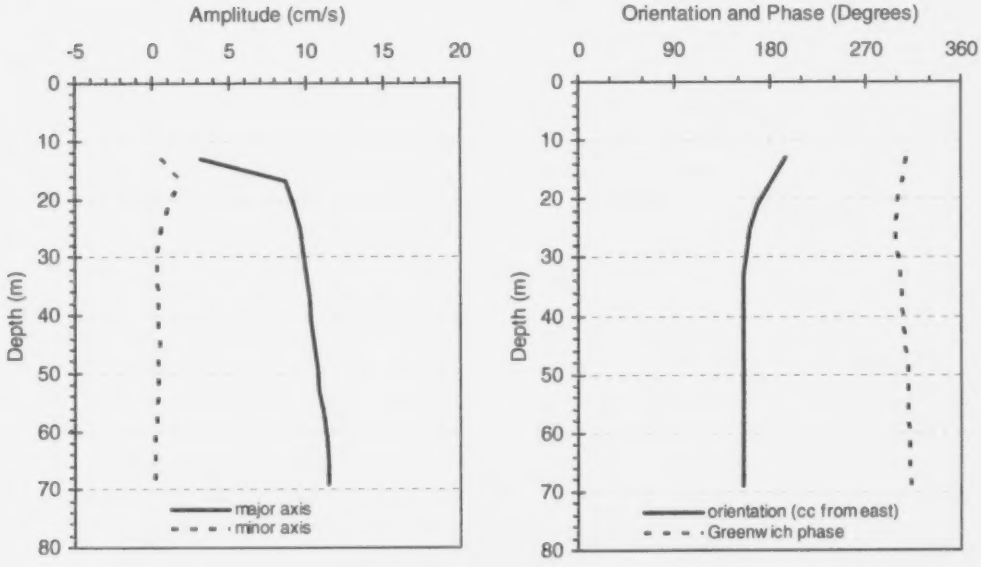
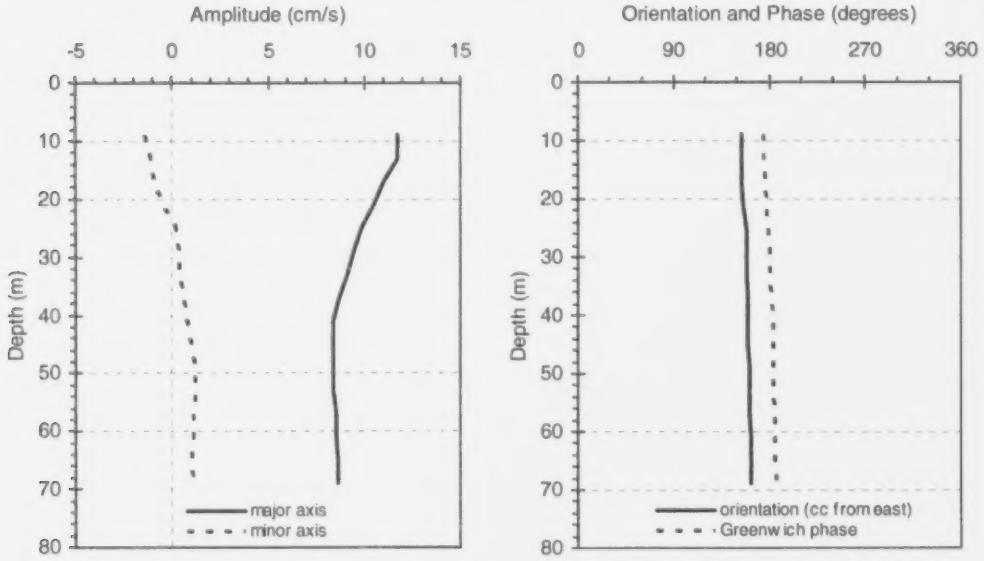


Figure 54– M2 Tidal Constituent, North Side of Barrow Strait

For Ice Free Period (Aug. 03, 2004 to Sep. 30, 2004):



For Solid Ice Period (Feb. 14, 2005 to Jul. 3, 2005):

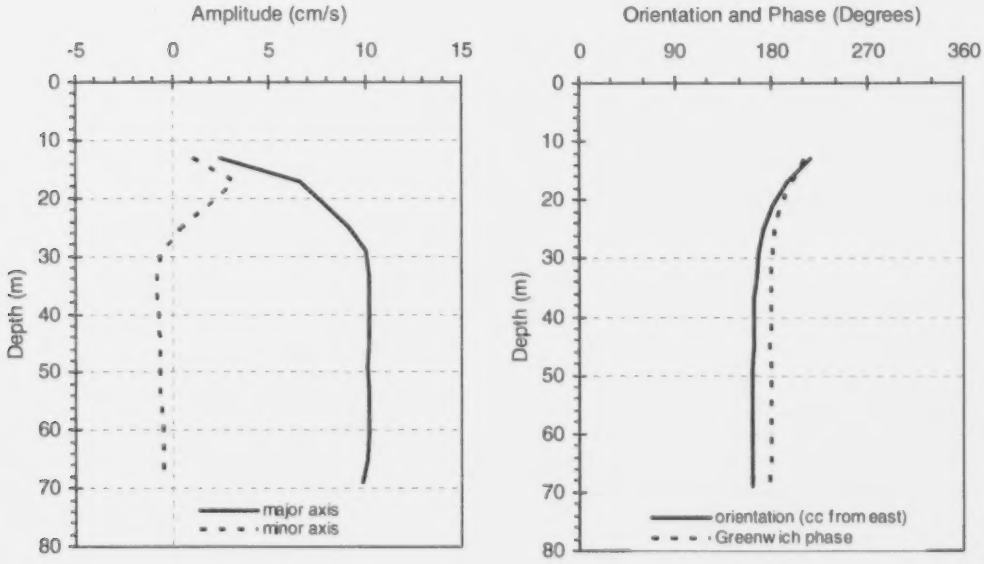
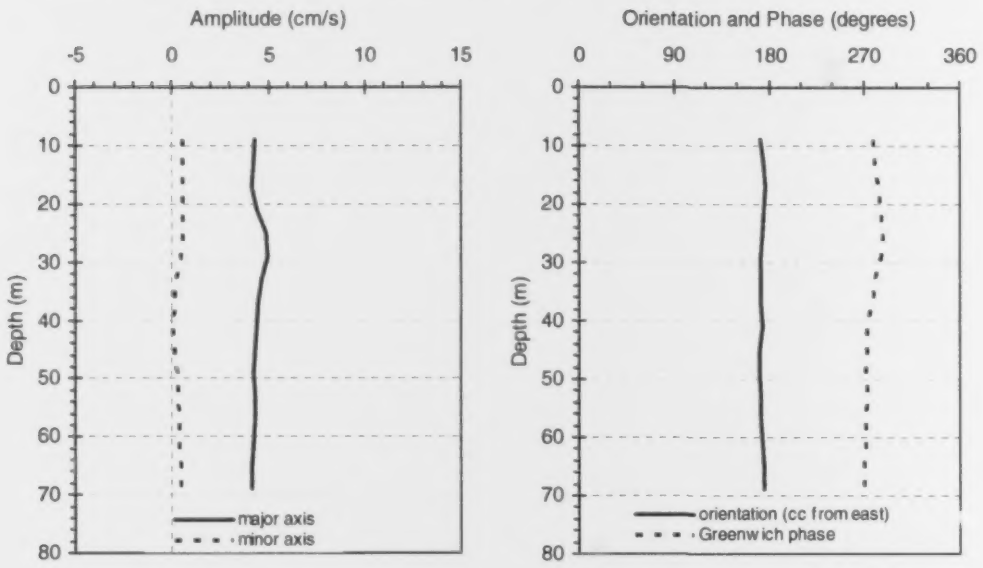


Figure 55 – O1 Tidal Constituent, North Side of Barrow Strait

For Ice Free Period (Aug. 03, 2004 to Sep. 30, 2004):



For Solid Ice Period (Feb. 14, 2005 to Jul. 3, 2005):

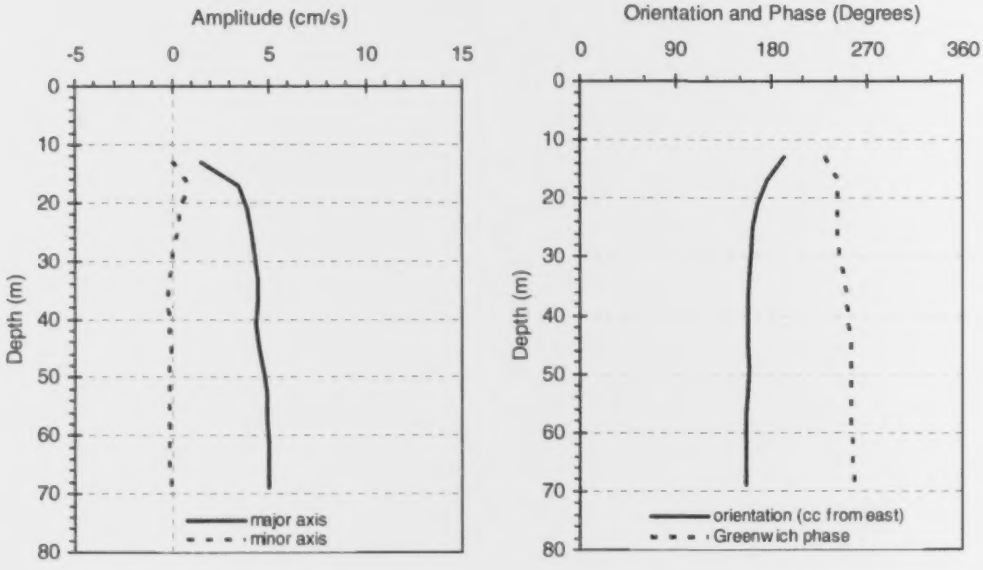
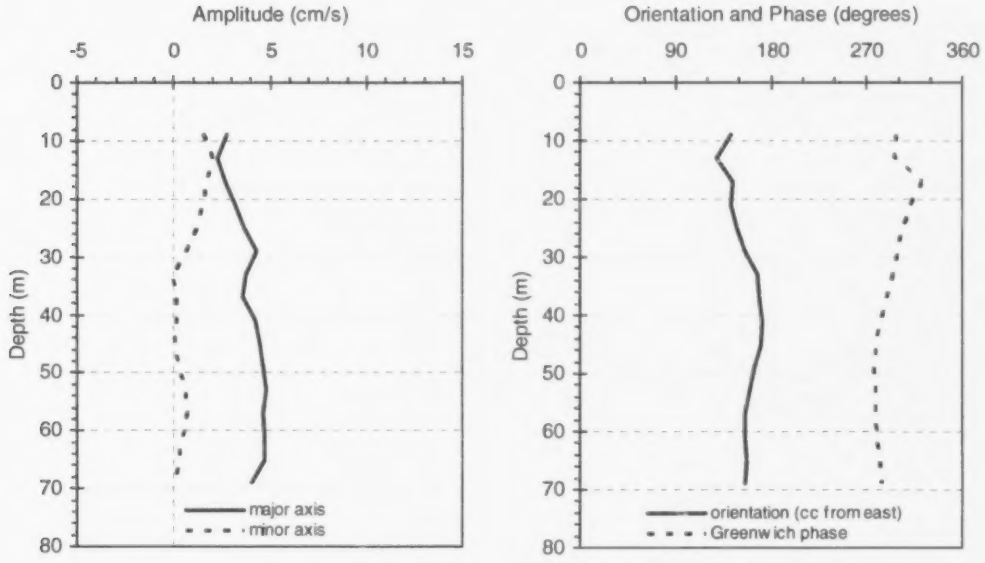


Figure 56 – P1 Tidal Constituent, North Side of Barrow Strait

For Ice Free Period (Aug. 03, 2004 to Sep. 30, 2004):



For Solid Ice Period (Feb. 14, 2005 to Jul. 3, 2005):

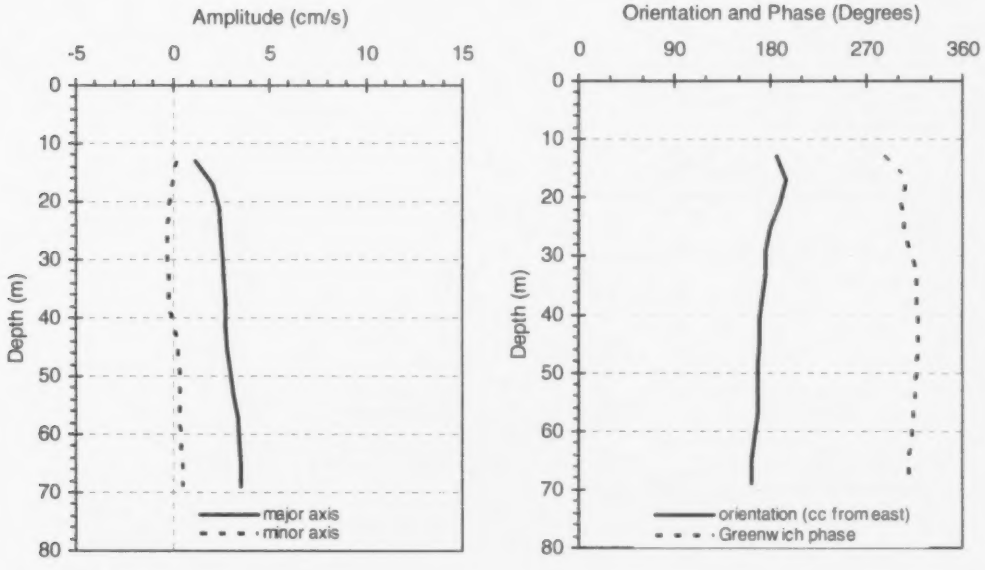
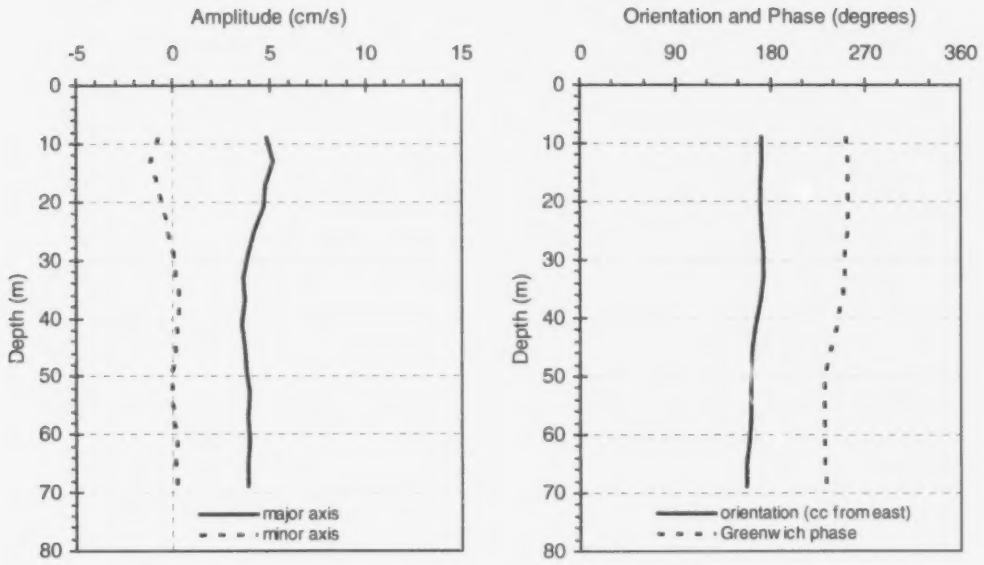


Figure 57 – S2 Tidal Constituent, North Side of Barrow Strait

For Ice Free Period (Aug. 03, 2004 to Sep. 30, 2004):



For Solid Ice Period (Feb. 14, 2005 to Jul. 3, 2005):

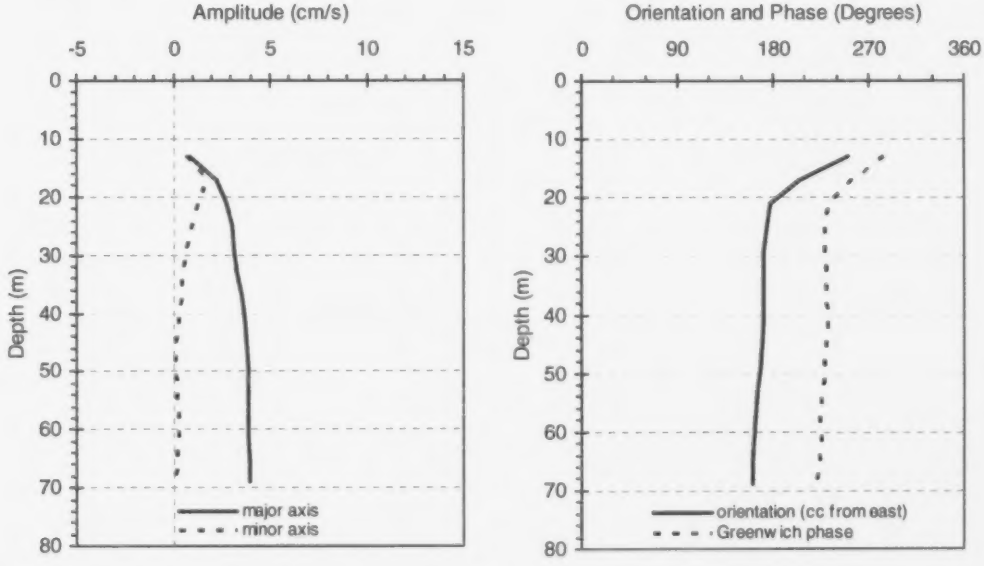


Figure 58 - Ice velocity data, South side of Barrow Strait
August 2004 - August 2005

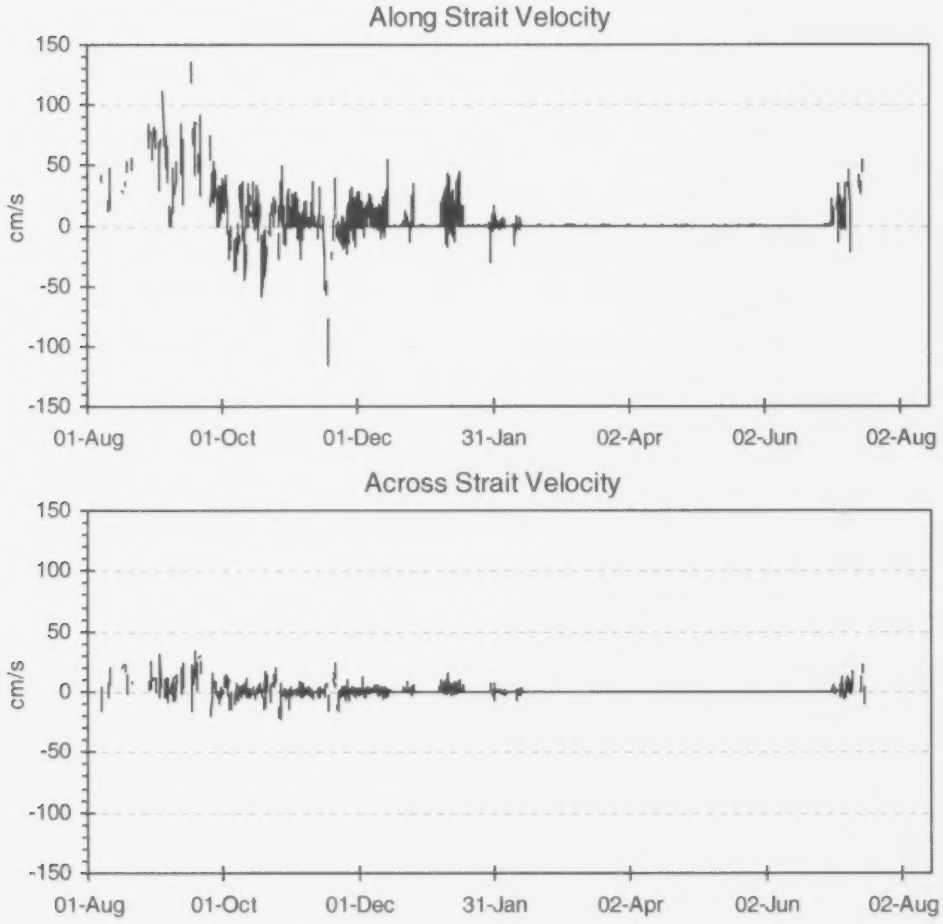


Figure 59 - Ice velocity data, South Central Barrow Strait
August 2004 - August 2005

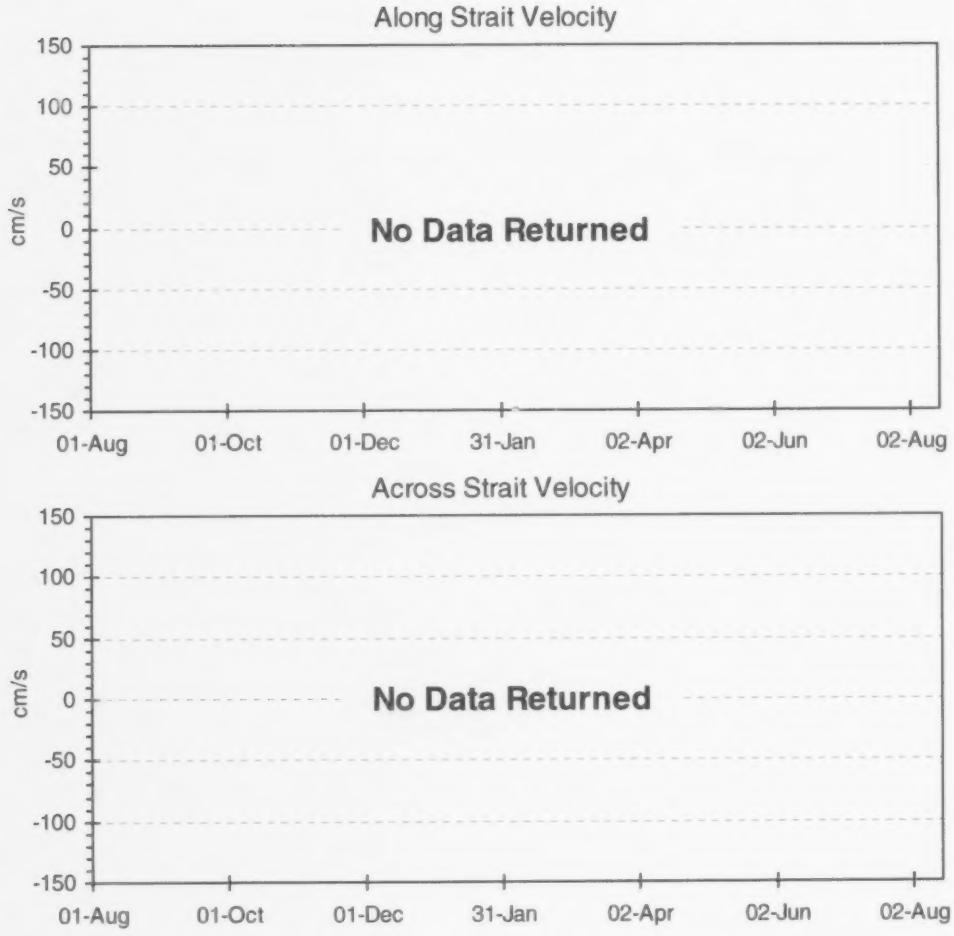


Figure 60 - Ice velocity data, Central Barrow Strait
August 2004 - August 2005

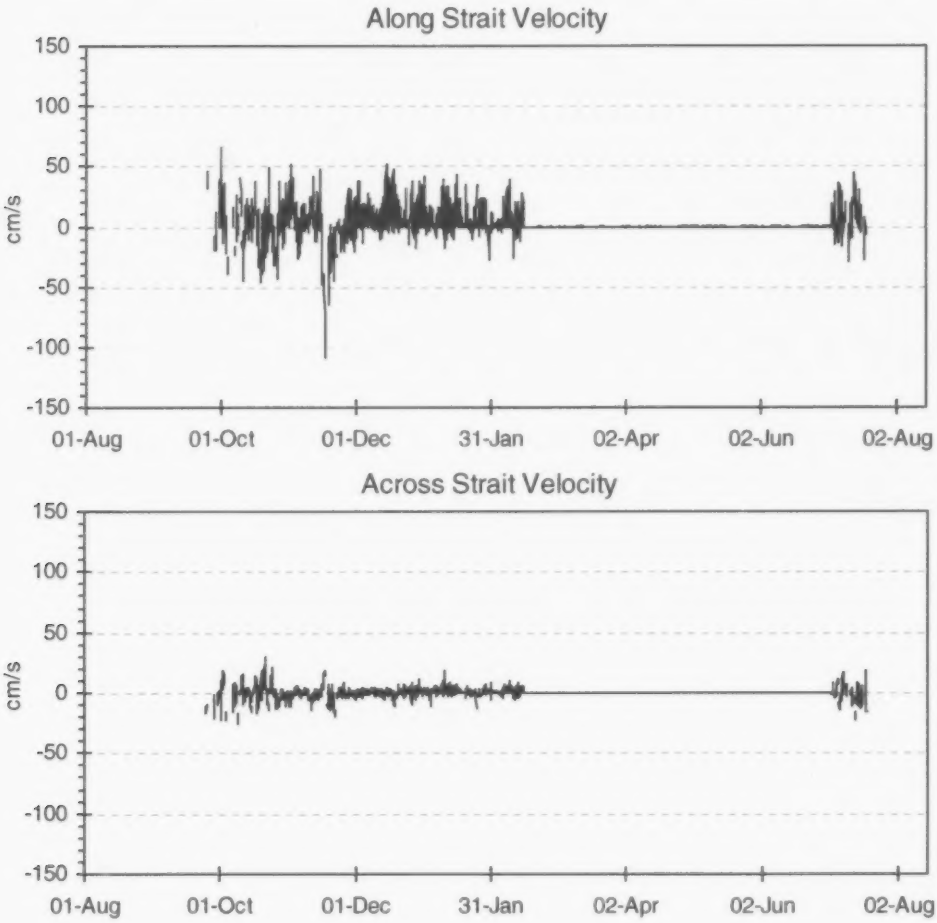


Figure 61 - Ice velocity data, North side of Barrow Strait
August 2004 - August 2005

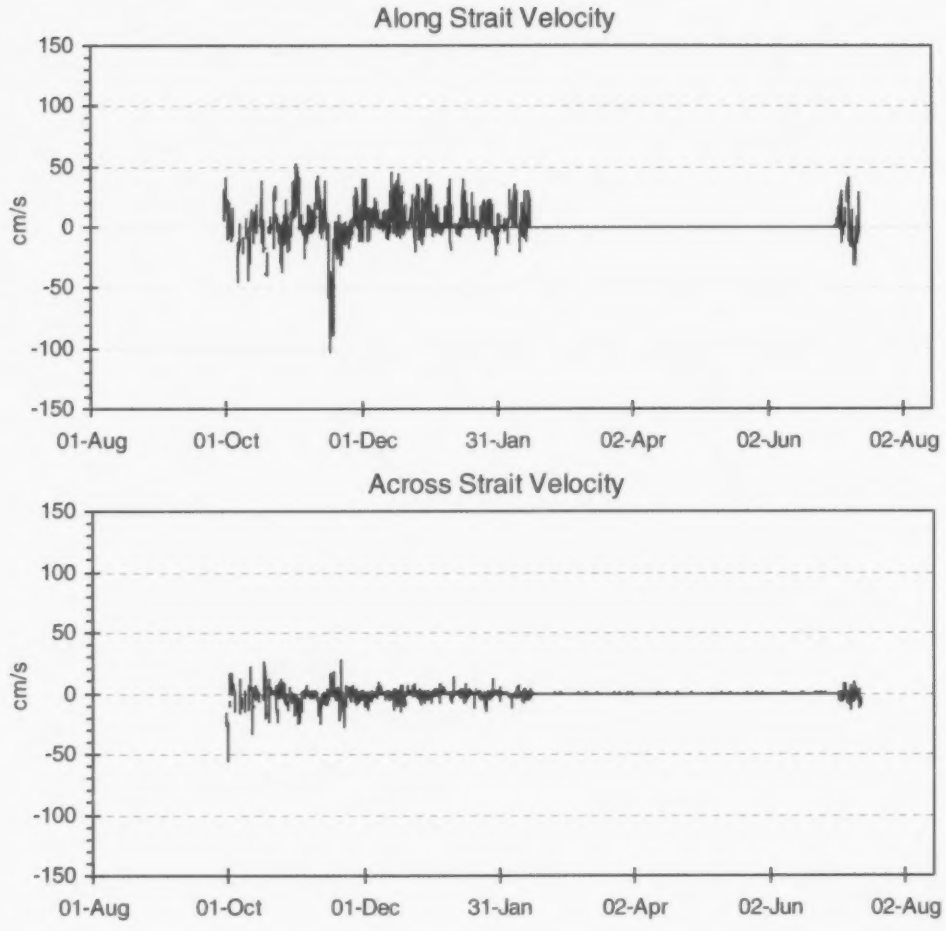


Figure 62 - CTD Station Positions, August 2005

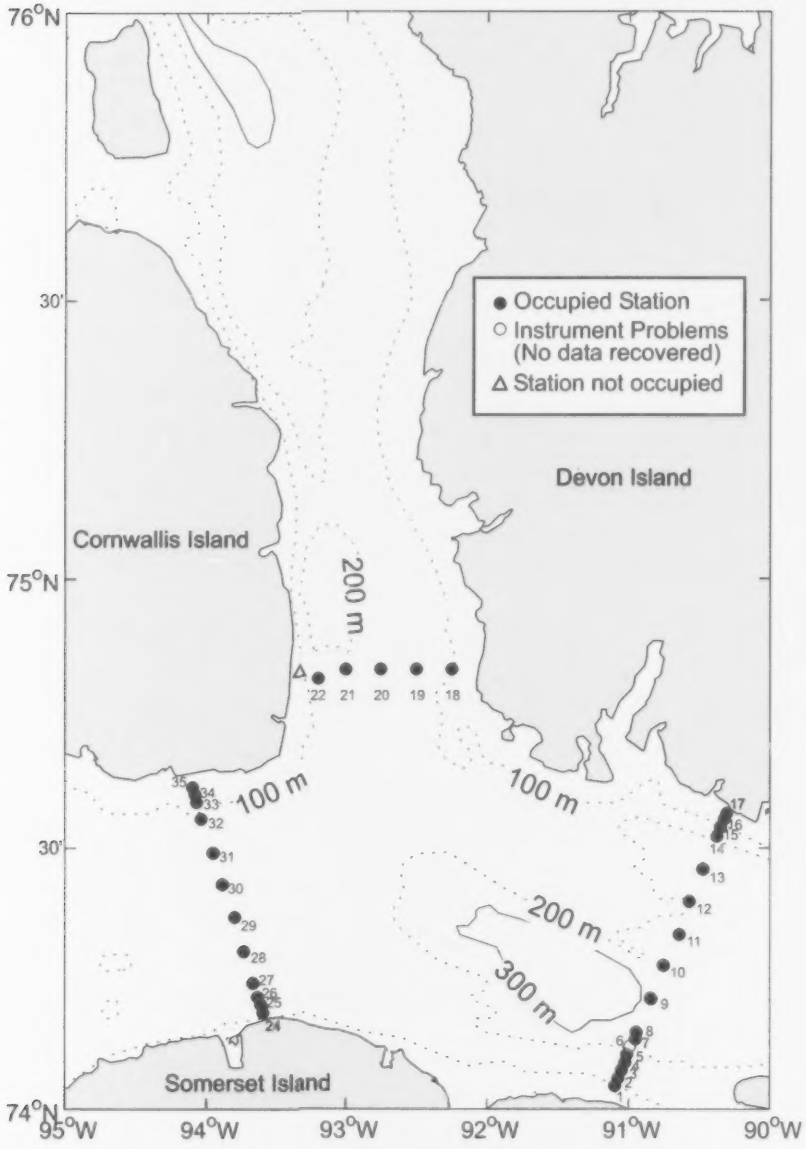


Figure 63 – Eastern Barrow Strait CTD Line, Aug 5-7, 2005.

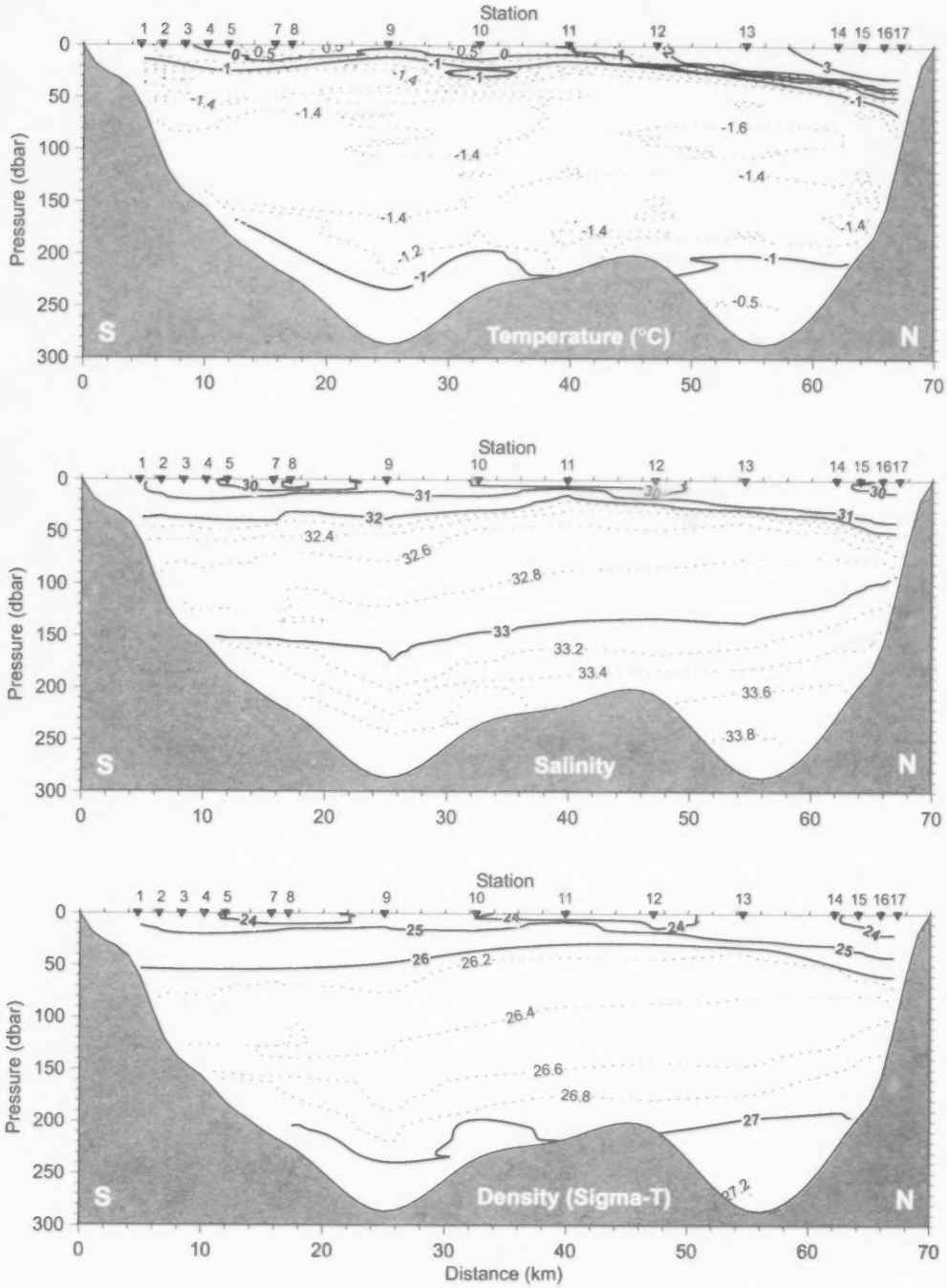


Figure 64 – Western Barrow Strait CTD Line, Aug. 11-12, 2005.

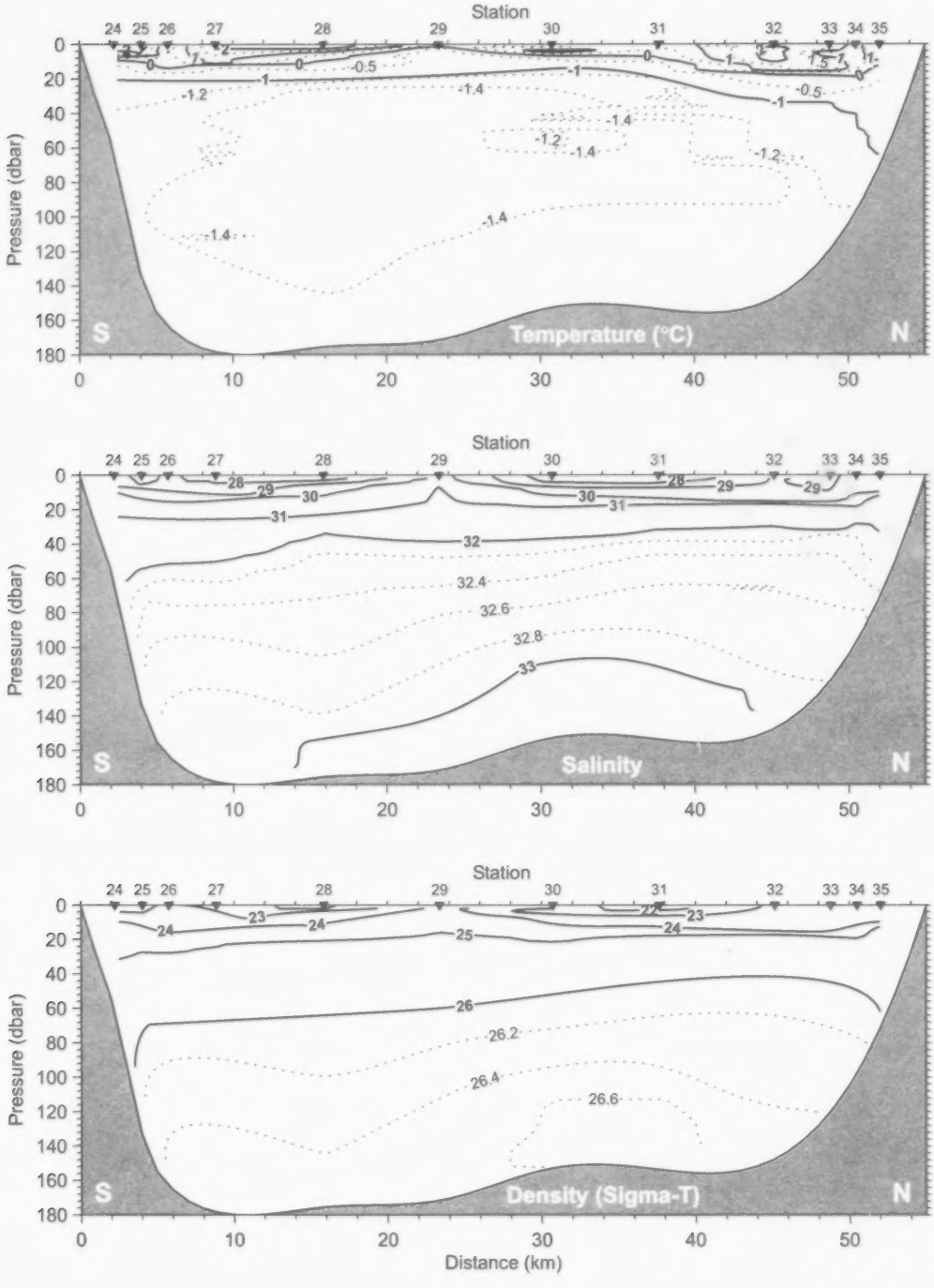


Figure 65 – Wellington Channel CTD Line, Aug. 11, 2005.

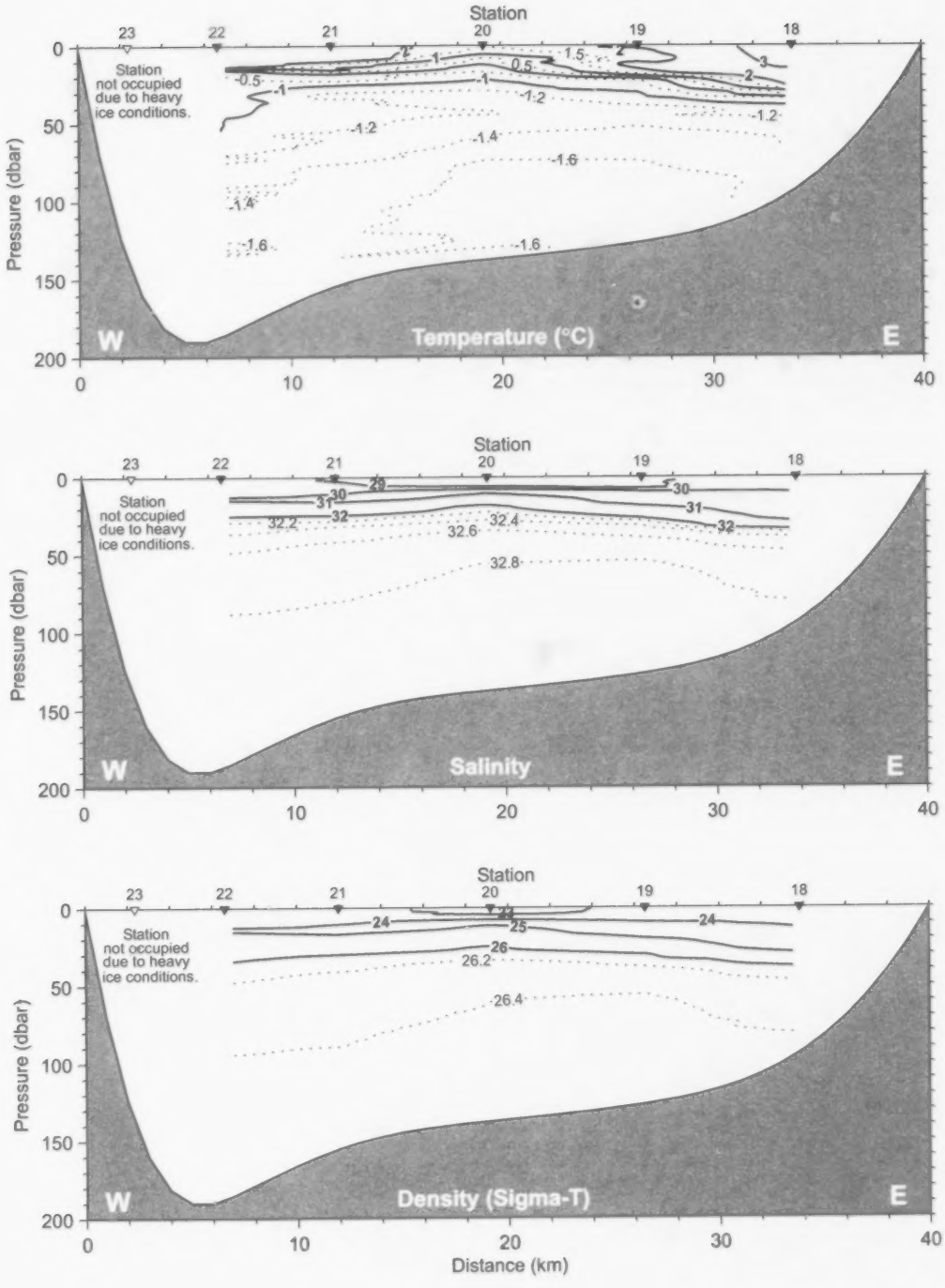


Figure 66: Low-pass filtered Pressure and Temperature.
South Side of Barrow Strait, August 2004 – August 2005

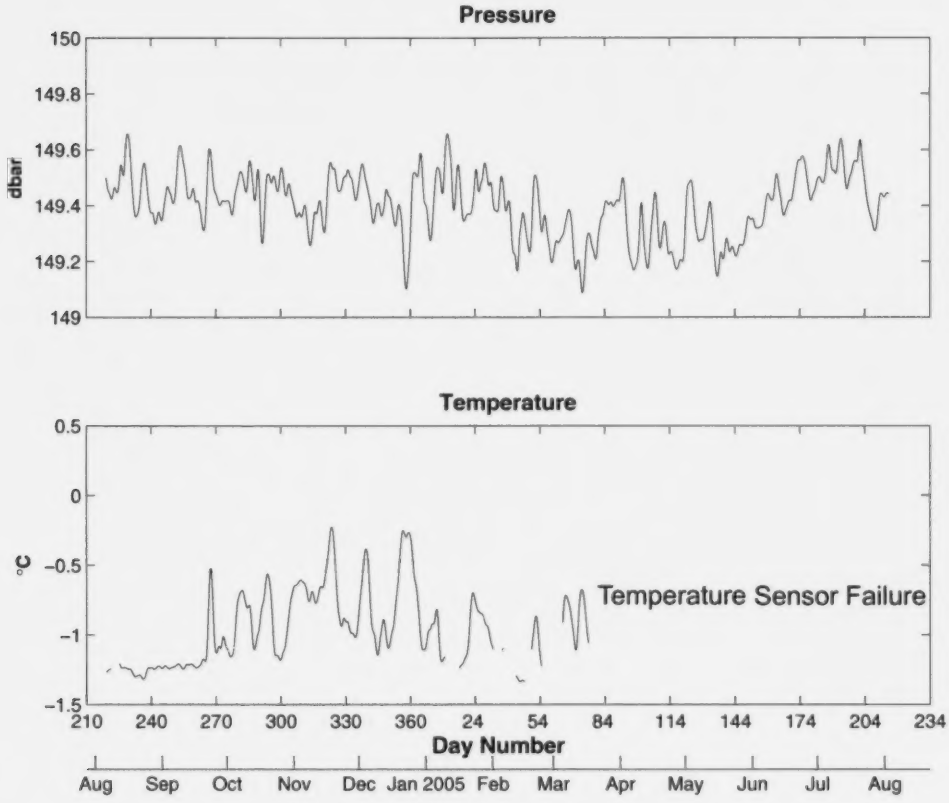


Figure 67: Low-pass filtered Pressure and Temperature.
Central Barrow Strait, August 2004 – August 2005

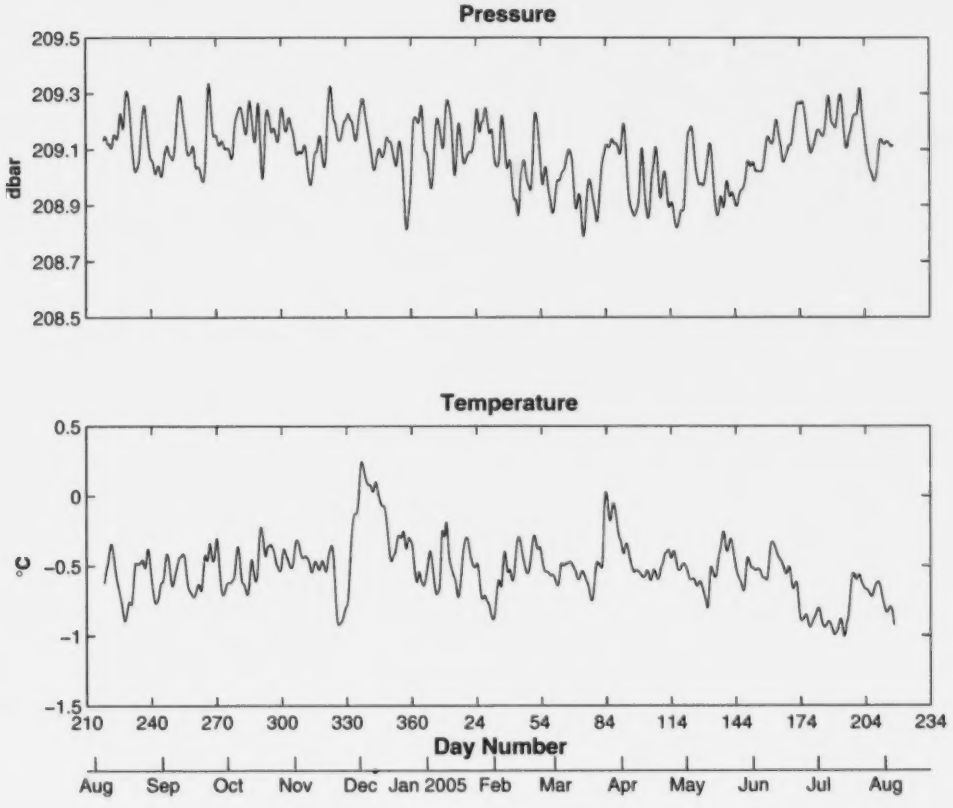


Figure 68: Low-pass filtered Pressure and Temperature.
North Side of Barrow Strait, August 2004 – August 2005

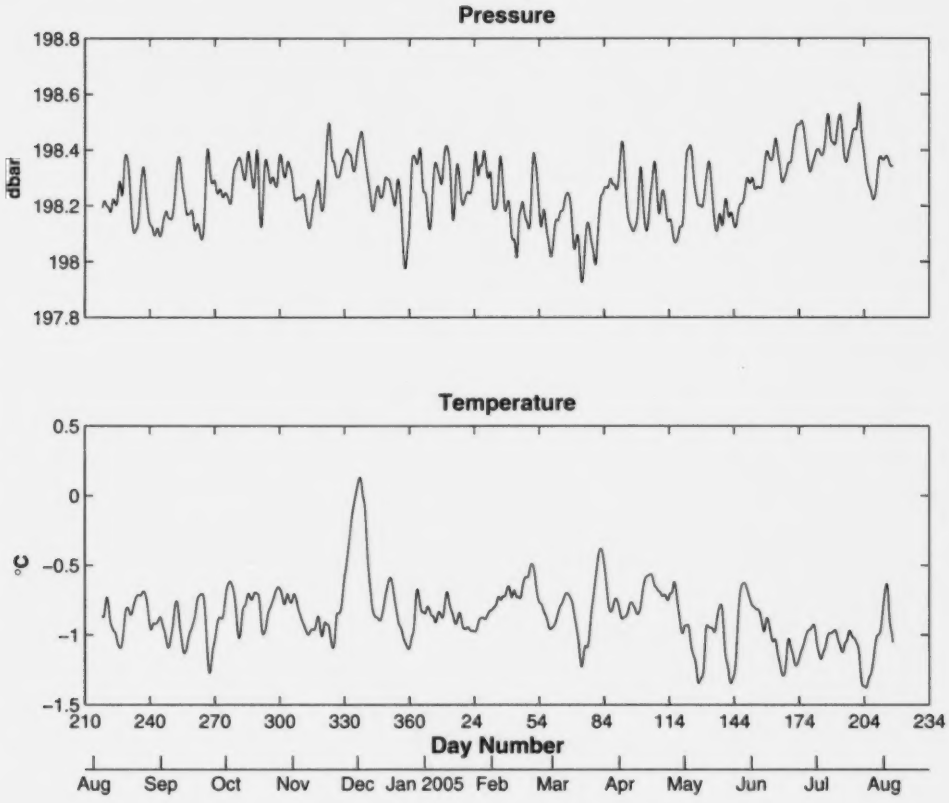
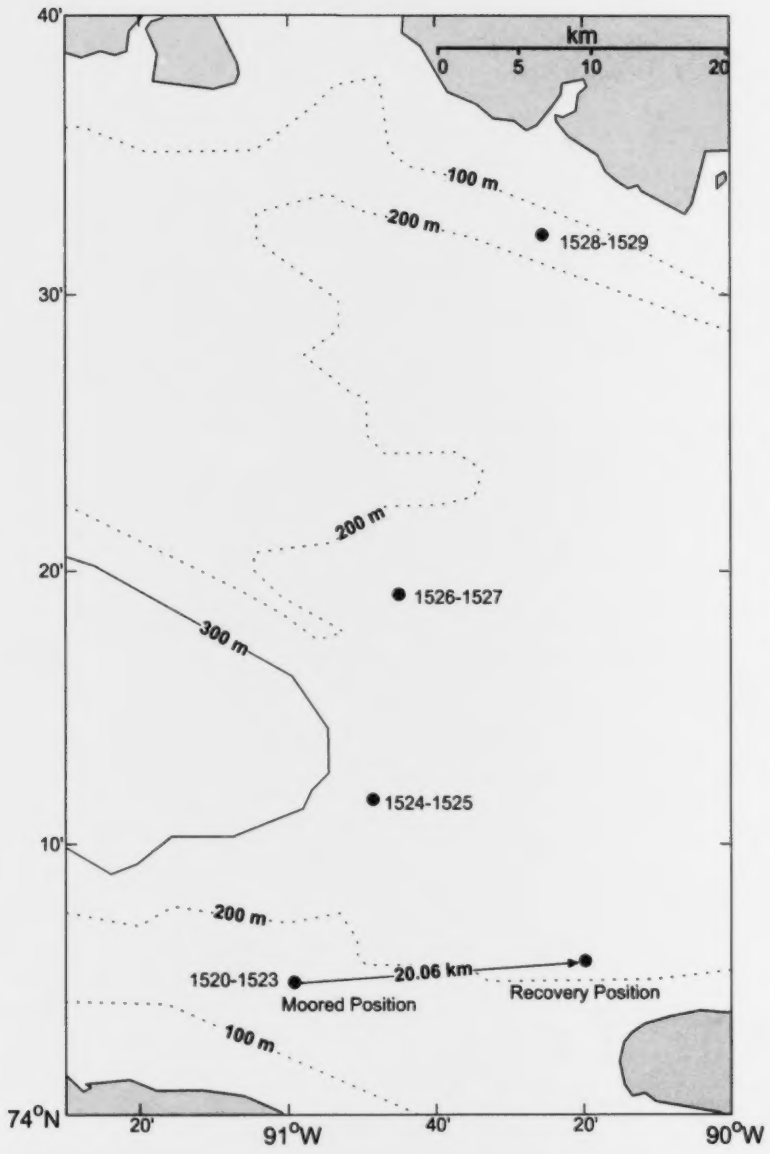
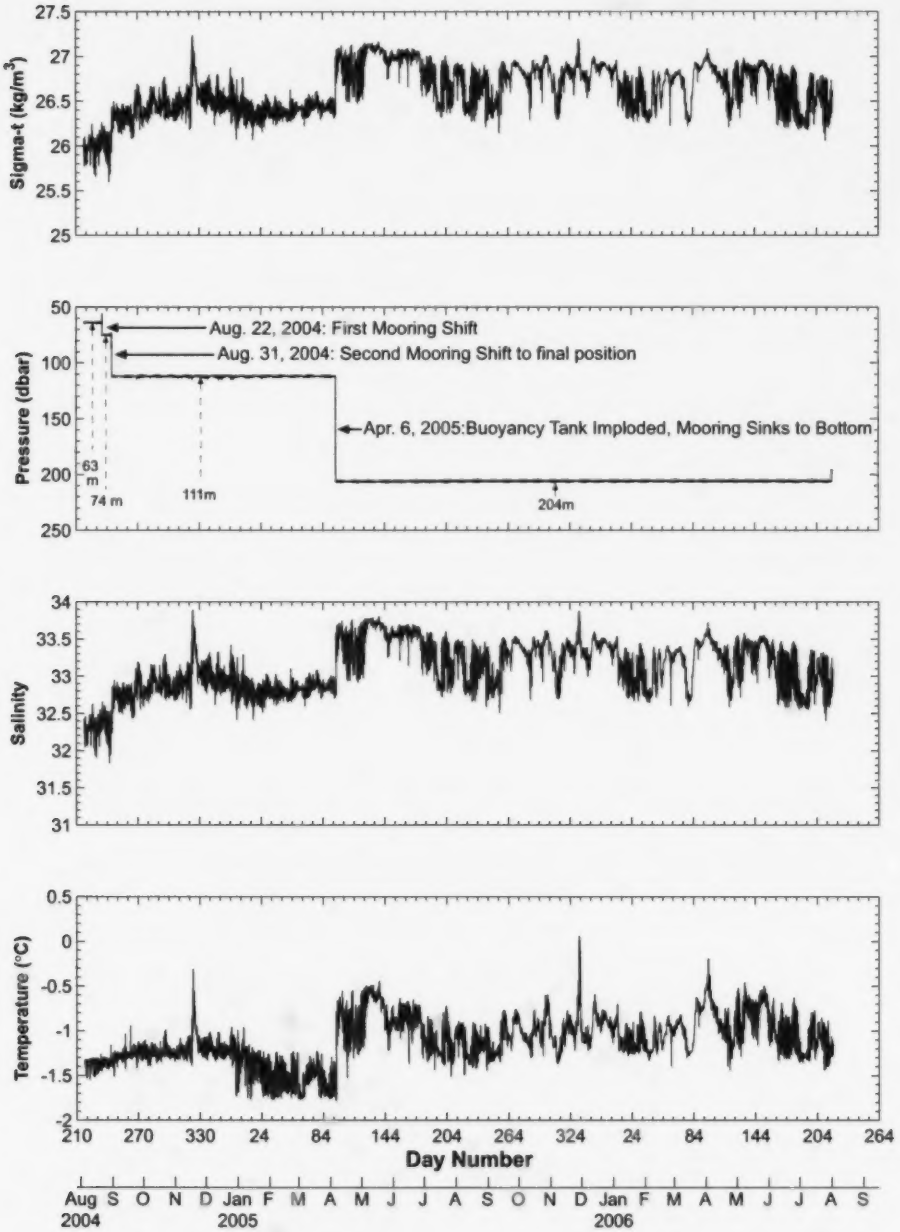


Figure 69: Mooring and Recovery Position of Icycler II And Microcat 0360



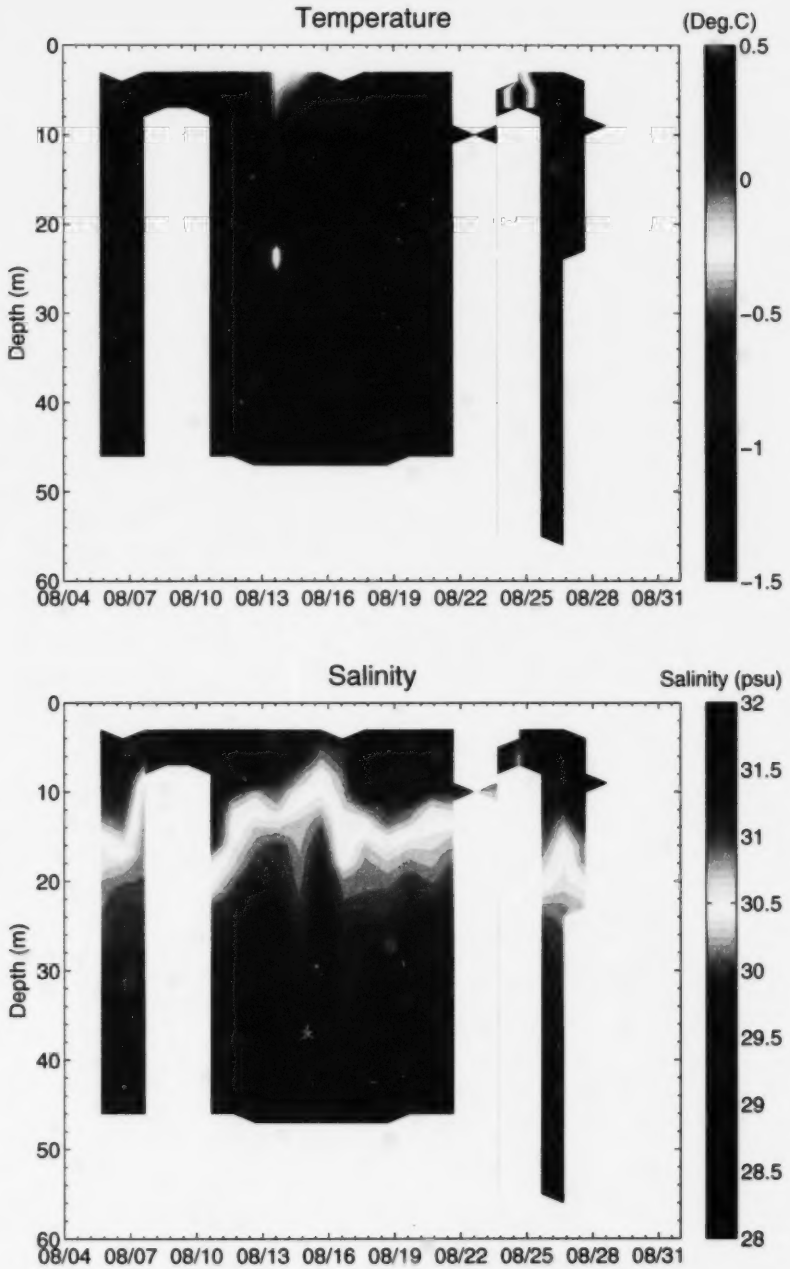
The original mooring position of Icycler II and Microcat 0360 on Aug 4, 2004 and its recovery position Aug. 2, 2006, 20.1 km to the east. The positions of the other moorings are indicated by dark filled circles.

Figure 70: Moored 30-min CTD Data, South Side Barrow Strait Instrument 0360, Aug. 4, 2004 – Aug. 2, 2006


Sigma-t (kg/m3)
Pressure (dbar)
Aug. 22, 2004: First Mooring Shift
Aug. 31, 2004: Second Mooring Shift to final position
Apr. 6, 2005:Buoyancy Tank Imploded, Mooring Sinks to Bottom
63 m
74 m
111m
204m
Salinity
Temperature (°C)
Day Number
Aug S O N D Jan F M A M J J A S O N D Jan F M A M J J A S
2004
2005
2006

Data returned during the two year deployment of MicroCat #0360, which was originally moored at 63 m. depth. The pressure record shows the two events where the mooring was dragged into deeper waters, and where the buoyancy tank imploded, causing the instrument to sink to the bottom.

Figure 71: Daily Icycler Measurements, South Side Barrow Strait, August 2004.



This diagram shows the data returned by Icycler II before the mooring shifted to deeper water.

Figure 71: Daily Icycler Measurements, South Side Barrow Strait, August 2004 (continued).

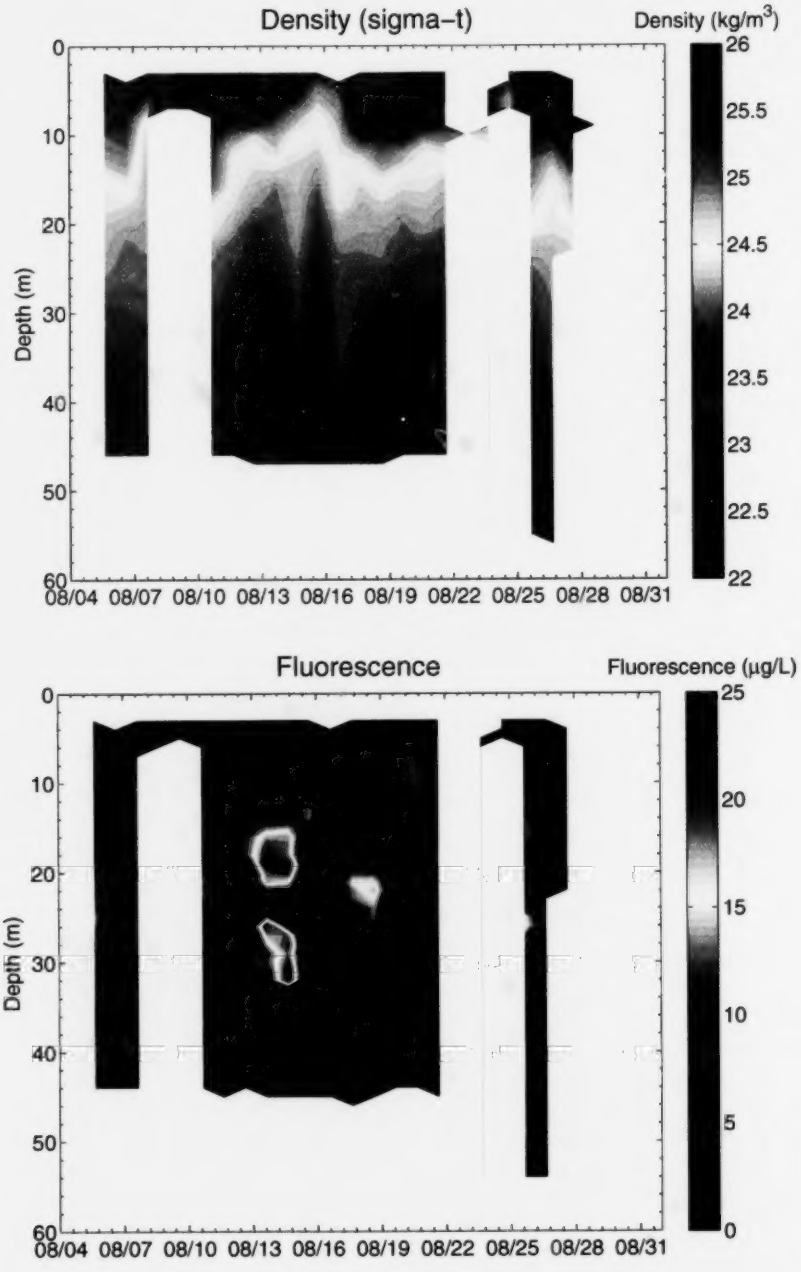


Table 1: Mooring Summary, Barrow Strait 2004-05

South Barrow Strait

BIO Consecutive Mooring Number	Instrument Type†	Moored Depth (m)	Bottom Depth (m)	Latitude (°N)	Longitude (°W)	Start Date-Time (GMT)	End Date-Time (GMT)	Sampling Interval (Seconds)
1520	ICYCLER	55	155	74.0819	-90.9867	05-Aug-2004 16:00	21-Aug-2004 16:00	86400
1520	MCTD	63	155	74.0819	-90.9867	04-Aug-2004 20:00	22-Aug-2004 04:00	1800
1521	ADCP	76	148	74.0834	-91.0427	04-Aug-2004 16:00	04-Aug-2005 12:00	7200
1521	MCTD	78	148	74.0834	-91.0427	Instrument Flooded, No Data Returned		1800
1521	WLR	148	148	74.0834	-91.0427	04-Aug-2004 16:00	04-Aug-2005 12:00	3600
1522	ADCP	143	147	74.0819	-91.0326	04-Aug-2004 18:00	04-Aug-2005 12:00	7200
1522	MCTD	145	147	74.0819	-91.0326	04-Aug-2004 17:30	04-Aug-2005 13:00	1800
1523	MCTD	39	151	74.0835	-91.0140	04-Aug-2004 15:00	04-Aug-2005 14:30	1800

South-Central Barrow Strait

BIO Consecutive Mooring Number	Instrument Type†	Moored Depth (m)	Bottom Depth (m)	Latitude (°N)	Longitude (°W)	Start Date-Time (GMT)	End Date-Time (GMT)	Sampling Interval (Seconds)
1524	LRADCP	232	246	74.1941	-90.8086	04-Aug-2004 14:00	06-Aug-2005 12:00	7200
1525	MCTD	29	249	74.1947	-90.8069	03-Aug-2004 20:00	06-Aug-2005 13:00	1800
1525	MCTD	69	249	74.1947	-90.8069	03-Aug-2004 20:00	06-Aug-2005 13:00	1800
1525	MCTD	148	249	74.1947	-90.8069	03-Aug-2004 20:00	06-Aug-2005 13:00	1800
1525	MCTD	245	249	74.1947	-90.8069	03-Aug-2004 20:00	06-Aug-2005 13:00	1800

†**ADCP**: RDI Workhorse ADCP, **LRADCP**: Long Range ADCP, **MCTD**: Moored CTD, **WLR**: Water Level Recorder

Table 1: Mooring Summary, Barrow Strait 2004-05 (continued)

Central Barrow Strait

BIO Consecutive Mooring Number	Instrument Type†	Moored Depth (m)	Bottom Depth (m)	Latitude (°N)	Longitude (°W)	Start Date-Time (GMT)	End Date-Time (GMT)	Sampling Interval (Seconds)
1526	ADCP	78	209	74.3192	-90.7501	03-Aug-2004 18:00	06-Aug-2005 14:00	7200
1526	MCTD	38	209	74.3192	-90.7501	03-Aug-2004 18:00	06-Aug-2005 14:30	1800
1526	MCTD	158	209	74.3192	-90.7501	03-Aug-2004 18:00	06-Aug-2005 14:30	1800
1527	MCTD	81	207	74.3199	-90.7434	03-Aug-2004 19:00	06-Aug-2005 15:00	1800
1527	WLR	207	207	74.3199	-90.7434	03-Aug-2004 19:00	06-Aug-2005 15:00	3600

North Barrow Strait

BIO Consecutive Mooring Number	Instrument Type†	Moored Depth (m)	Bottom Depth (m)	Latitude (°N)	Longitude (°W)	Start Date-Time (GMT)	End Date-Time (GMT)	Sampling Interval (Seconds)
1528	ADCP	76	200	74.5361	-90.4244	03-Aug-2004 14:00	06-Aug-2005 16:00	7200
1528	MCTD	78	200	74.5361	-90.4244	03-Aug-2004 14:00	06-Aug-2005 17:00	1800
1528	MCTD	158	200	74.5361	-90.4244	03-Aug-2004 14:00	06-Aug-2005 17:00	1800
1529	MCTD	37	196	74.5367	-90.4064	Instrument was lost		1800
1529	WLR	196	196	74.5367	-90.4064	03-Aug-2004 15:00	06-Aug-2005 17:00	3600

West Barrow Strait

BIO Consecutive Mooring Number	Instrument Type†	Moored Depth (m)	Bottom Depth (m)	Latitude (°N)	Longitude (°W)	Start Date-Time (GMT)	End Date-Time (GMT)	Sampling Interval (Seconds)
1530	WLR	165	165	74.4106	-93.8275	Instrument was lost		3600

†**ADCP**: RDI Workhorse ADCP, **LRADCP**: Long Range ADCP, **MCTD**: Moored CTD, **WLR**: Water Level Recorder

Table 2: South Side Barrow Strait, Microcat/ADCP statistical summary
Late summer: August 4, 2004 - September 20, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
39	38	-1.34	0.11	-1.64	-0.40	31.67	0.23	30.50	32.26	25.47	0.18	24.52	25.95	37.29	17.05	-1.43	83.14	7.53	6.42	-11.49	30.87
63†	62	-1.37	0.05	-1.55	-1.26	32.30	0.12	31.91	32.63	25.98	0.10	25.66	26.24	32.83	16.08	-9.42	79.78	6.03	5.95	-12.83	35.04
78	77	Instrument Flooded												28.49	15.43	-15.35	66.79	4.74	5.75	-15.02	22.92
145	137	-1.30	0.04	-1.51	-1.14	32.71	0.10	32.42	33.03	26.30	0.08	26.07	26.57	12.04	12.06	-24.46	41.06	2.75	5.42	-12.67	17.41

† *Statistics to Aug. 22, 2004 at 0400 only, afterward the mooring shifted to deeper waters.*

Table 3: South-Central Barrow Strait, Microcat/ADCP statistical summary
Late summer: August 4, 2004 - September 20, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
29	32	-1.18	0.33	-1.54	1.27	31.93	0.33	30.48	32.66	25.67	0.27	24.46	26.27	23.99	14.18	-17.32	74.12	7.65	7.04	-14.97	30.99
69	72	-1.35	0.12	-1.61	-0.82	32.64	0.11	32.15	32.89	26.25	0.09	25.86	26.45	17.08	14.16	-26.27	50.96	5.70	6.14	-15.03	22.43
148	152	-1.21	0.06	-1.52	-1.01	33.07	0.07	32.81	33.42	26.60	0.06	26.39	26.88	12.03	13.13	-24.77	47.45	4.47	6.16	-11.69	25.86
245	216	-0.49	0.12	-1.00	-0.30	33.80	0.08	33.41	33.89	27.16	0.06	26.86	27.23	4.29	16.20	-41.97	47.42	5.72	7.30	-12.53	32.27

Table 4: Central Barrow Strait, Microcat/ADCP statistical summary
Late summer: August 3, 2004 - September 20, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
38	40	-1.32	0.16	-1.62	-0.83	32.60	0.09	32.22	32.77	26.22	0.07	25.91	26.36	4.20	14.96	-32.68	49.61	0.70	6.63	-24.07	19.85
81	72	-1.41	0.07	-1.64	-1.14	32.85	0.05	32.68	33.03	26.42	0.04	26.28	26.56	2.31	13.89	-34.87	41.86	0.62	5.99	-23.46	19.55
158		-1.08	0.07	-1.23	-0.81	33.46	0.07	33.17	33.69	26.91	0.05	26.68	27.09								

Table 5: North Side Barrow Strait, Microcat/ADCP statistical summary
Late summer: August 3, 2004 - September 20, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
40	42	Instrument was lost												-2.89	13.02	-38.88	34.53	-2.37	4.76	-17.66	12.61
78	70	-1.40	0.07	-1.60	-1.22	32.88	0.06	32.72	33.15	26.45	0.05	26.32	26.67	-1.93	13.70	-38.73	32.24	-2.40	4.50	-15.88	11.48
158		-1.12	0.06	-1.29	-0.69	33.44	0.11	33.04	33.79	26.89	0.09	26.57	27.16								

Table 6: South Side Barrow Strait, Microcat/ADCP statistical summary
Fall: September 21, 2004 - December 20, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
39	38	-1.54	0.18	-1.76	-1.09	31.86	0.31	31.09	33.11	25.62	0.25	25.00	26.63	3.32	21.75	-110.4	83.01	0.21	7.56	-32.75	55.56
63	62	Instrument drifted to deeper water on Aug 22, 2004												4.79	20.68	-82.55	81.00	-0.14	6.91	-31.15	48.03
78	77	Instrument Flooded												3.73	20.80	-80.10	75.98	-0.48	6.43	-22.88	30.68
145	137	-0.90	0.24	-1.27	-0.24	33.37	0.31	32.67	33.90	26.83	0.24	26.28	27.23	1.40	17.42	-45.50	48.30	-1.45	7.79	-29.52	22.47

Table 7: South-Central Barrow Strait, Microcat/ADCP statistical summary
Fall: September 21, 2004 - December 20, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
29	32	-1.64	0.13	-1.77	-0.84	31.49	0.57	28.76	32.35	25.32	0.47	23.10	26.02	2.95	15.59	-50.90	44.68	0.76	8.70	-41.64	71.78
69	72	-1.32	0.14	-1.73	-0.86	32.48	0.20	31.25	32.83	26.12	0.16	25.13	26.40	1.54	15.46	-52.08	51.99	0.20	7.03	-25.98	43.76
148	152	-1.08	0.08	-1.27	-0.75	33.28	0.13	32.86	33.76	26.76	0.10	26.43	27.15	1.09	16.71	-59.89	50.54	1.04	6.20	-17.87	24.86
245	216	-0.32	0.24	-0.95	0.35	33.86	0.10	33.52	34.13	27.20	0.07	26.95	27.39	0.54	15.94	-47.73	41.70	4.32	6.24	-14.53	24.70

Table 8: Central Barrow Strait, Microcat/ADCP statistical summary
Fall: September 21, 2004 - December 20, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
38	40	-1.52	0.19	-1.78	-0.89	31.87	0.29	30.94	32.74	25.63	0.24	24.87	26.33	-0.69	16.57	-48.45	62.54	-0.42	5.51	-19.92	14.51
81	72	-1.31	0.10	-1.75	-1.01	32.71	0.10	32.25	32.96	26.31	0.08	25.94	26.51	-2.76	17.59	-68.45	54.93	-0.41	6.60	-23.93	18.50
158		-1.00	0.12	-1.20	-0.55	33.46	0.15	33.12	33.93	26.91	0.12	26.63	27.28								

Table 9: North Side Barrow Strait, Microcat/ADCP statistical summary
Fall: September 21, 2004 - December 20, 2004

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
40	42	Instrument was lost												-0.74	16.82	-84.85	44.25	-2.20	5.07	-25.32	16.95
78	70	-1.29	0.16	-1.75	-0.91	32.69	0.31	31.40	33.40	26.29	0.25	25.24	26.85	0.20	17.55	-78.66	44.69	-3.20	5.38	-28.52	10.08
158		-0.99	0.23	-1.46	0.03	33.42	0.27	32.47	34.10	26.88	0.22	26.11	27.40								

Table 10: South Side Barrow Strait, Microcat/ADCP statistical summary
Winter: December 21, 2004 - March 20, 2005

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
39	38	-1.71	0.06	-1.77	-1.33	32.13	0.16	31.79	32.59	25.84	0.13	25.57	26.22	8.95	15.05	-26.24	76.90	0.14	3.97	-12.94	12.69
63	62	Instrument drifted to deeper water on Aug 22, 2004												9.23	17.58	-35.90	75.11	0.64	4.97	-16.42	19.03
78	77	Instrument Flooded												8.10	18.75	-46.06	77.09	0.55	5.40	-22.68	18.41
145	137	-1.06	0.32	-1.71	-0.23	33.16	0.36	32.52	33.90	26.66	0.28	26.16	27.23	4.16	15.86	-43.23	47.80	-0.21	6.48	-25.16	24.69

Table 11: South-Central Barrow Strait, Microcat/ADCP statistical summary
Winter: December 21, 2004 - March 20, 2005

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
29	32	-1.73	0.04	-1.78	-1.44	32.10	0.17	31.70	32.52	25.82	0.14	25.50	26.16	9.13	14.55	-28.11	58.56	2.42	5.45	-15.24	20.20
69	72	-1.63	0.12	-1.78	-1.26	32.62	0.14	32.17	32.92	26.24	0.11	25.87	26.49	7.23	15.22	-31.04	61.52	1.66	6.58	-24.16	21.06
148	152	-1.18	0.18	-1.77	-0.66	33.14	0.19	32.73	33.74	26.65	0.15	26.33	27.12	5.83	16.54	-37.79	55.96	2.46	6.68	-20.83	30.10
245	216	-0.30	0.20	-1.00	0.38	33.85	0.10	33.26	34.13	27.19	0.07	26.75	27.39	2.67	15.65	-34.51	45.84	4.28	6.67	-16.07	42.30

Table 12: Central Barrow Strait, Microcat/ADCP statistical summary
Winter: December 21, 2004 - March 20, 2005

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
38	40	-1.71	0.06	-1.79	-1.40	32.49	0.16	31.96	32.81	26.13	0.13	25.71	26.40	6.24	15.30	-31.95	61.80	0.61	5.69	-19.30	16.17
81	72	-1.61	0.15	-1.77	-1.24	32.77	0.08	32.48	33.04	26.37	0.06	26.13	26.57	4.31	16.00	-32.77	66.60	0.07	6.47	-21.84	19.44
158		-1.07	0.09	-1.30	-0.64	33.39	0.14	33.08	33.85	26.85	0.11	26.60	27.21								

Table 13: North Side Barrow Strait, Microcat/ADCP statistical summary
Winter: December 21, 2004 - March 20, 2005

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
40	42	Instrument was lost												0.62	13.20	-45.02	35.59	-1.38	4.22	-15.70	12.73
78	70	-1.48	0.18	-1.79	-1.12	32.98	0.09	32.74	33.29	26.53	0.07	26.34	26.78	-1.24	14.25	-47.99	29.63	-2.01	4.23	-15.00	12.28
158		-1.11	0.13	-1.45	-0.65	33.44	0.12	33.13	33.79	26.89	0.10	26.65	27.16								

Table 14: South Side Barrow Strait, Microcat/ADCP statistical summary
Spring: March 21, 2005 - June 20, 2005

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
39	38	-1.56	0.08	-1.75	-1.33	32.23	0.12	31.48	32.68	25.92	0.10	25.31	26.29	14.00	13.07	-24.04	57.30	0.46	4.82	-22.49	16.28
63	62	Instrument drifted to deeper water on Aug 22, 2004												12.48	13.49	-29.19	50.78	0.73	4.15	-15.54	15.65
78	77	Instrument Flooded												11.12	14.36	-34.94	51.72	0.60	4.54	-17.11	14.05
145	137	-1.31	0.17	-1.70	-0.68	33.00	0.20	32.66	33.68	26.54	0.16	26.27	27.07	3.26	13.63	-37.68	39.06	-0.02	6.16	-23.18	17.50

Table 15: South-Central Barrow Strait, Microcat/ADCP statistical summary
Spring: March 21, 2005 - June 20, 2005

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
29	32	-1.68	0.05	-1.75	-1.40	31.73	0.31	31.19	32.56	25.52	0.25	25.08	26.20	11.18	13.80	-28.02	51.68	3.05	6.46	-18.22	23.29
69	72	-1.59	0.10	-1.79	-1.27	32.73	0.11	32.12	33.10	26.33	0.09	25.83	26.63	9.10	13.23	-32.63	57.06	1.73	6.94	-23.52	24.20
148	152	-1.27	0.17	-1.77	-0.81	33.18	0.20	32.76	33.66	26.69	0.16	26.35	27.06	5.68	13.57	-26.99	49.27	1.35	5.79	-16.65	19.51
245	216	-0.35	0.13	-0.87	0.06	33.84	0.07	33.47	34.09	27.18	0.05	26.91	27.37	1.37	11.53	-30.82	41.80	2.87	5.34	-22.06	30.61

Table 16: Central Barrow Strait, Microcat/ADCP statistical summary
Spring: March 21, 2005 - June 20, 2005

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
38	40	-1.65	0.11	-1.80	0.74	32.39	0.27	31.56	32.94	26.06	0.22	25.38	26.50	5.63	15.90	-38.88	49.49	-0.79	7.05	-35.54	19.38
81	72	-1.60	0.12	-1.79	-1.24	32.89	0.08	32.69	33.27	26.46	0.06	26.30	26.76	3.95	16.44	-38.95	47.87	-0.85	7.20	-29.33	22.49
158		-1.06	0.12	-1.50	-0.74	33.51	0.09	33.22	33.72	26.95	0.07	26.71	27.12								

Table 17: North Side Barrow Strait, Microcat/ADCP statistical summary
Spring: March 21, 2005 - June 20, 2005

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
40	42	Instrument was lost												1.16	13.10	-40.26	30.03	-1.83	4.18	-16.30	11.80
78	70	-1.43	0.09	-1.69	-1.19	33.12	0.14	32.82	33.42	26.64	0.12	26.40	26.89	1.04	13.60	-37.41	32.30	-1.59	4.02	-16.54	10.24
158		-1.20	0.20	-1.61	-0.54	33.51	0.08	33.31	33.85	26.95	0.06	26.79	27.21								

Table 18: South Side Barrow Strait, Microcat/ADCP statistical summary
Early Summer: June 21, 2005 - August 4, 2005

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
39	38	-1.50	0.08	-1.67	-1.33	32.09	0.16	31.51	32.51	25.81	0.13	25.34	26.16	26.60	15.28	-20.72	60.44	3.61	5.68	-12.65	18.71
63	62	Instrument drifted to deeper water on Aug 22, 2004												23.05	14.82	-22.23	54.54	2.83	4.86	-12.43	16.16
78	77	Instrument Flooded												19.79	14.53	-24.69	48.61	2.52	5.30	-14.44	19.80
145	137	-1.33	0.09	-1.59	-0.95	32.87	0.16	32.61	33.55	26.44	0.13	26.23	26.98	8.45	14.09	-37.97	32.50	1.18	6.34	-20.48	19.64

Table 19: South-Central Barrow Strait, Microcat/ADCP statistical summary
Early Summer: June 21, 2005 - August 6, 2005

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
29	32	-1.55	0.10	-1.70	-0.96	32.02	0.42	30.78	32.68	25.75	0.34	24.75	26.29	11.49	15.87	-33.14	46.21	3.36	6.81	-19.00	24.19
69	72	-1.55	0.09	-1.76	-1.23	32.75	0.07	32.49	32.95	26.34	0.05	26.13	26.51	8.69	14.75	-28.92	49.47	2.82	6.63	-17.33	32.96
148	152	-1.30	0.12	-1.74	-0.96	33.11	0.17	32.83	33.58	26.63	0.14	26.41	27.00	5.79	14.86	-32.12	42.85	2.31	5.78	-13.37	19.41
245	216	-0.54	0.11	-1.06	-0.38	33.74	0.05	33.41	33.81	27.11	0.04	26.87	27.16	0.92	13.21	-39.53	43.10	3.76	5.89	-9.03	35.19

Table 20: Central Barrow Strait, Microcat/ADCP statistical summary
Early Summer: June 21, 2005 - August 6, 2005

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
38	40	-1.56	0.19	-1.73	0.56	32.30	0.27	31.64	32.76	25.98	0.22	25.45	26.35	1.87	17.52	-37.93	56.71	3.00	7.93	-19.53	22.91
81	72	-1.61	0.06	-1.74	-1.32	32.87	0.03	32.71	32.99	26.44	0.03	26.31	26.54	1.16	18.22	-33.82	55.28	3.69	8.76	-20.64	28.48
158		-1.25	0.09	-1.47	-0.84	33.40	0.14	33.03	33.66	26.86	0.11	26.57	27.06								

Table 21: North Side Barrow Strait, Microcat/ADCP statistical summary
Early Summer: June 21, 2005 - August 6, 2005

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
40	42	Instrument was lost												1.68	15.25	-50.91	35.77	-2.28	4.49	-15.24	13.87
78	70	-1.56	0.08	-1.72	-1.36	32.92	0.07	32.72	33.20	26.48	0.06	26.32	26.71	2.60	16.22	-48.97	39.55	-2.56	3.98	-15.68	11.19
158		-1.34	0.11	-1.58	-0.86	33.41	0.07	33.18	33.69	26.88	0.05	26.69	27.09								

Table 22: South Side Barrow Strait, Microcat/ADCP statistical summary
Complete Record: August 4, 2004 – August 4, 2005

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
39	38	-1.56	0.16	-1.77	-0.40	32.02	0.28	30.50	33.11	25.76	0.23	24.52	26.63	14.65	20.17	-110.4	83.14	1.62	6.30	-32.75	55.56
63	62	Instrument drifted to deeper water on Aug 22, 2004												13.69	19.29	-82.55	81.00	1.44	5.80	-31.15	48.03
78	77	Instrument Flooded												11.87	19.27	-80.10	77.09	1.10	5.79	-22.88	30.68
145	137	-1.15	0.28	-1.71	-0.23	33.08	0.34	32.42	33.90	26.60	0.27	26.07	27.23	4.78	15.48	-45.50	48.30	0.08	6.74	-29.52	24.69

Table 23: South-Central Barrow Strait, Microcat/ADCP statistical summary
Complete Record: August 4, 2004 – August 6, 2005

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
29	32	-1.60	0.22	-1.78	1.27	31.82	0.45	28.76	32.68	25.59	0.37	23.10	26.29	10.33	16.00	-50.90	74.12	2.96	7.27	-41.64	71.78
69	72	-1.50	0.18	-1.79	-0.82	32.63	0.17	31.25	33.10	26.25	0.14	25.13	26.63	7.74	15.32	-52.08	61.52	1.98	6.93	-25.98	43.76
148	152	-1.20	0.16	-1.77	-0.66	33.17	0.18	32.73	33.76	26.68	0.14	26.33	27.15	5.41	15.58	-59.89	55.96	2.07	6.26	-20.83	30.10
245	216	-0.37	0.20	-1.06	0.38	33.83	0.09	33.26	34.13	27.18	0.07	26.75	27.39	1.81	14.62	-47.73	47.42	4.06	6.30	-22.06	42.30

Table 24: Central Barrow Strait, Microcat/ADCP statistical summary
Complete Record: August 3, 2004 – August 6, 2005

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
38	40	-1.58	0.19	-1.80	0.74	32.30	0.35	30.94	32.94	25.98	0.29	24.87	26.50	3.55	16.25	-48.45	62.54	0.32	6.56	-35.54	22.91
81	72	-1.51	0.17	-1.79	-1.01	32.81	0.10	32.25	33.27	26.39	0.08	25.94	26.76	1.81	16.79	-68.45	66.60	0.25	7.09	-29.33	28.48
158		-1.07	0.13	-1.50	-0.55	33.45	0.13	33.03	33.93	26.90	0.11	26.57	27.28								

Table 25: North Barrow Strait, Microcat/ADCP statistical summary
Complete Record: August 3, 2004 – August 6, 2005

Depth (m)		Temperature (°C)				Salinity (ppt)				Density (Sigma-T)				Along-Strait Velocity (cm/s)				Cross-Strait Velocity (cm/s)			
Micro Cat	ADCP	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max	Avg	SD	Min	Max
40	42	Instrument was lost												0.09	14.46	-84.85	44.25	-1.94	4.55	-25.32	16.95
78	70	-1.42	0.16	-1.79	-0.91	32.92	0.24	31.40	33.42	26.48	0.19	25.24	26.89	0.08	15.23	-78.66	44.69	-2.32	4.54	-28.52	12.28
158		-1.30	0.04	-1.61	0.03	33.45	0.17	32.47	34.10	26.90	0.13	26.11	27.40								

Table 26: South Side Barrow Strait, Water Level Recorder Statistical Summary

	Temperature (°C)				Depth (m)			
Season	**Avg**	**SD**	**Min**	**Max**	**Avg**	**SD**	**Min**	**Max**
Late Summer	-1.24	0.04	-1.36	-1.12	147.86	0.51	146.73	149.06
Fall	-0.83	0.24	-1.22	-0.18	147.84	0.50	146.60	149.11
Winter	-0.99	0.28	-1.36	-0.14	147.77	0.49	146.56	149.27
Spring	Temperature Sensor Failed. Little data after Mar 19, 2005				147.72	0.48	146.61	148.85
Early Summer					147.90	0.50	146.79	149.17
Year	-0.98†	0.28†	-1.36†	-0.14†	147.80	0.50	146.56	149.27

† Annual mean is incomplete due to instrument failure.

Table 27: Central Barrow Strait, Water Level Recorder Statistical Summary

	Temperature (°C)				Depth (m)			
Season	**Avg**	**SD**	**Min**	**Max**	**Avg**	**SD**	**Min**	**Max**
Late Summer	-0.59	0.15	-0.98	-0.23	206.85	0.54	205.65	208.11
Fall	-0.40	0.26	-0.98	0.32	206.88	0.53	205.57	208.21
Winter	-0.52	0.17	-0.95	0.08	206.79	0.52	205.51	208.31
Spring	-0.48	0.16	-0.91	0.18	206.74	0.51	205.49	207.91
Early Summer	-0.81	0.15	-1.15	-0.50	206.90	0.54	205.68	208.27
Year	-0.53	0.22	-1.15	0.32	206.82	0.53	205.49	208.31

Table 28: North Side Barrow Strait, Water Level Recorder Statistical Summary

	Temperature (°C)				Depth (m)			
Season	**Avg**	**SD**	**Min**	**Max**	**Avg**	**SD**	**Min**	**Max**
Late Summer	-0.89	0.14	-1.19	-0.57	196.05	0.57	194.78	197.37
Fall	-0.75	0.28	-1.36	0.22	196.14	0.56	194.72	197.57
Winter	-0.84	0.18	-1.29	-0.22	196.06	0.56	194.70	197.68
Spring	-0.88	0.24	-1.43	-0.26	196.09	0.54	194.77	197.37
Early Summer	-1.06	0.17	-1.43	-0.40	196.25	0.58	194.94	197.72
Year	-0.86	0.24	-1.43	0.22	196.11	0.56	194.70	197.72

Table 29 - Tidal Constants for K1 Constituent

South Side Barrow Strait

For Ice Free Period (Aug. 4, 2004 – Sep. 25, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10	10.42	0.51	169	12
14	10.30	0.63	163	14
18	10.54	0.40	154	16
22	11.23	-0.11	155	20
26	11.33	-0.35	159	21
30	11.25	0.01	163	21
34	11.26	-0.18	164	19
38	11.33	-0.34	164	15
42	11.38	0.02	164	11
46	10.75	0.90	162	11
50	10.18	1.25	161	11
54	9.57	1.21	161	11
58	8.93	0.61	165	11
62	8.52	-0.04	169	13
66	8.28	-0.31	170	13
70	8.14	-0.23	170	13
73	9.11	0.12	172	9
77	8.56	-0.04	173	7
81	9.16	-0.16	173	5
85	9.02	0.09	171	5
89	9.15	0.38	169	4
93	8.09	0.61	168	359
97	7.40	1.20	171	358
101	7.16	2.30	177	0
105	7.04	3.05	183	3
109	6.94	3.19	182	3
113	6.67	3.49	178	356
117	6.60	3.42	179	355
121	6.60	3.48	178	354
125	6.58	3.41	178	355
129	6.74	3.18	180	354
133	6.64	3.09	178	346
137	6.53	3.11	178	338

Table 29 - Tidal Constants for K1 Constituent (continued)

South Side Barrow Strait

For Solid Ice Period (Feb. 12, 2005 – Jul. 1, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10	5.05	1.18	201	353
14	6.06	1.19	195	354
18	6.65	1.10	187	352
22	6.98	1.24	179	347
26	7.55	1.19	174	343
30	7.81	1.35	169	338
34	7.89	1.36	166	333
38	8.07	1.33	163	329
42	8.13	1.26	163	327
46	8.19	1.25	163	326
50	8.18	1.34	162	324
54	8.27	1.50	162	322
58	8.47	1.42	161	320
62	8.64	1.53	161	319
66	8.81	1.43	160	318
70	8.88	1.31	159	319
73	9.13	1.44	158	320
77	9.28	1.61	158	319
81	9.51	1.73	159	318
85	9.62	1.73	159	317
89	9.59	1.79	159	317
93	9.68	1.95	159	317
97	9.67	2.19	160	315
101	9.75	2.33	160	316
105	9.86	2.45	160	316
109	9.92	2.51	160	316
113	10.05	2.67	160	316
117	10.20	2.67	160	316
121	10.32	2.70	160	316
125	10.58	2.70	160	315
129	10.70	2.52	160	314
133	11.01	2.41	161	313
137	11.26	2.22	163	309

Table 29 - Tidal Constants for K1 Constituent (continued)

South Central Barrow Strait

For Ice Free Period (Aug. 4, 2004 – Sep. 25, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
24	10.50	-0.85	167	350
32	10.53	0.18	166	350
40	10.88	-0.16	162	350
48	11.06	-0.29	160	351
56	11.61	-1.68	161	349
64	11.86	-1.95	160	349
72	11.66	-2.31	157	352
80	11.79	-2.42	161	352
88	12.35	-2.59	161	357
96	13.10	-2.92	159	358
104	13.33	-2.61	158	2
112	13.20	-2.83	156	4
120	12.85	-2.36	156	4
128	13.08	-2.67	155	5
136	13.23	-2.91	153	6
144	13.52	-2.85	153	7
152	13.78	-2.73	151	11
160	13.81	-2.99	153	11
168	14.23	-3.19	153	9
176	14.82	-3.50	154	9
184	16.21	-3.45	154	10
192	18.82	-4.31	152	9
200	21.00	-4.95	151	7
208	19.35	-5.02	153	8
216	17.46	-4.44	150	12

Table 29 - Tidal Constants for K1 Constituent (continued)

South Central Barrow Strait

For Solid Ice Period (Feb. 12, 2005 – Jul. 1, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
24	11.89	-0.96	171	358
32	11.93	-1.36	165	356
40	11.82	-1.47	164	355
48	11.55	-1.39	163	355
56	11.27	-1.34	162	354
64	11.08	-1.34	161	355
72	11.08	-1.25	161	355
80	10.97	-1.26	160	356
88	10.83	-1.29	160	357
96	10.66	-1.20	159	357
104	10.61	-1.13	159	358
112	10.76	-1.18	159	358
120	10.84	-1.19	158	357
128	11.15	-1.35	158	357
136	11.38	-1.43	156	357
144	11.72	-1.61	156	358
152	12.02	-1.87	156	359
160	12.34	-1.99	156	360
168	12.31	-2.14	156	1
176	12.43	-2.04	156	2
184	12.63	-2.18	156	3
192	13.90	-2.66	155	5
200	14.88	-3.18	154	7
208	13.27	-3.17	154	7
216	11.68	-2.99	154	7

Table 29 - Tidal Constants for K1 Constituent (continued)

Central Barrow Strait

For Ice Free Period (Aug. 3, 2004 – Sep. 24, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	13.39	-0.74	169	0
16	13.95	-1.25	167	357
20	14.21	-1.79	167	1
24	14.22	-1.57	167	5
28	13.16	-1.23	166	8
32	12.66	-1.41	166	9
36	12.72	-1.51	169	7
44	14.10	-1.67	168	5
48	14.22	-1.71	168	5
52	13.87	-1.66	167	5
56	13.58	-1.66	166	5
60	13.75	-1.66	166	4
64	13.73	-1.64	166	5
68	13.49	-1.68	166	4
72	13.29	-1.70	167	4

For Solid Ice Period (Feb. 14, 2005 – Jul. 3, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	11.07	-0.50	185	357
16	12.36	-1.04	182	357
20	12.97	-1.51	177	356
24	13.12	-1.94	173	354
28	12.97	-2.28	170	354
32	12.69	-2.32	169	353
36	12.52	-2.30	169	353
44	12.14	-2.28	170	356
48	12.32	-2.34	169	357
52	12.39	-2.30	169	357
56	12.35	-2.35	169	357
60	12.35	-2.36	169	357
64	12.42	-2.41	170	357
68	12.30	-2.45	170	357
72	12.23	-2.57	170	358

Table 29 - Tidal Constants for K1 Constituent (continued)

North Side Barrow Strait

For Ice Free Period (Aug. 3, 2004 – Sep. 30, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
9	7.35	0.14	179	348
13	7.51	0.50	181	351
17	7.96	0.88	175	346
21	8.24	1.27	173	337
25	8.26	1.35	168	329
29	8.60	0.92	163	321
33	8.26	0.08	159	322
37	7.95	0.14	161	320
41	8.01	-0.11	162	315
45	8.04	0.03	162	313
49	8.20	0.28	163	311
53	8.34	0.78	163	311
57	8.50	1.18	164	313
61	8.76	1.14	163	312
65	9.17	1.04	161	313
69	9.36	0.92	162	316

For Solid Ice Period (Feb. 14, 2005 – Jul. 3, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
9	**Signal to Noise Ratio too low for analysis**			
13	3.12	0.47	194	308
17	8.67	1.75	181	304
21	9.19	1.17	168	299
25	9.57	0.61	161	298
29	9.81	0.31	158	300
33	10.01	0.32	156	302
37	10.24	0.37	155	304
41	10.35	0.45	154	306
45	10.46	0.49	155	307
49	10.69	0.43	155	309
53	10.86	0.36	155	310
57	11.08	0.30	155	311
61	11.31	0.23	155	311
65	11.43	0.22	155	312
69	11.39	0.18	155	313

Table 30 - Tidal Constants for M2 Constituent

South Side Barrow Strait

For Ice Free Period (Aug. 4, 2004 – Sep. 25, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10	8.16	-1.17	164	212
14	8.05	-0.74	162	209
18	8.09	-0.70	160	208
22	7.99	-0.59	159	207
26	7.85	-0.46	160	208
30	7.57	-0.03	163	207
34	7.35	0.24	165	206
38	7.40	0.37	162	206
42	7.68	0.13	159	203
46	7.89	-0.08	158	202
50	8.26	-0.13	158	200
54	8.67	-0.36	157	199
58	9.00	-0.48	157	199
62	9.13	-0.70	157	200
66	9.32	-0.89	159	201
70	9.43	-1.02	160	202
73	9.66	-1.29	161	202
77	10.01	-1.45	163	204
81	10.07	-1.60	163	205
85	10.08	-1.59	163	207
89	10.18	-1.61	162	209
93	10.03	-1.33	162	211
97	9.96	-1.10	161	210
101	9.81	-0.85	160	210
105	9.68	-0.72	160	211
109	9.42	-0.55	161	210
113	9.16	-0.46	162	210
117	8.99	-0.27	162	209
121	8.89	-0.09	163	210
125	8.67	0.13	165	210
129	8.42	0.19	168	210
133	8.26	0.30	169	211
137	8.20	0.39	170	211

Table 30 - Tidal Constants for M2 Constituent (continued)

South Side Barrow Strait

For Solid Ice Period (Feb. 12, 2005 – Jul 1, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10	5.90	1.34	198	226
14	6.03	1.71	190	216
18	6.25	1.32	185	214
22	7.37	0.25	180	209
26	8.79	-1.12	177	207
30	9.69	-2.08	173	205
34	9.98	-2.26	170	203
38	10.01	-2.31	169	201
42	9.99	-2.20	168	200
46	9.94	-2.15	166	199
50	9.82	-1.98	166	199
54	9.62	-1.89	165	197
58	9.56	-1.81	163	196
62	9.67	-1.82	162	195
66	9.57	-1.80	162	195
70	9.33	-1.77	161	195
73	9.63	-1.98	161	198
77	9.45	-1.89	161	197
81	9.44	-1.89	162	197
85	9.39	-1.86	163	196
89	9.41	-1.90	163	197
93	9.38	-1.98	163	197
97	9.37	-1.99	163	199
101	9.36	-2.11	164	200
105	9.27	-2.22	164	201
109	9.31	-2.27	166	202
113	9.31	-2.23	168	203
117	9.38	-2.31	170	205
121	9.55	-2.42	173	206
125	9.58	-2.41	177	209
129	9.48	-2.23	181	213
133	9.57	-1.95	186	217
137	9.47	-1.39	190	221

Table 30 - Tidal Constants for M2 Constituent (continued)

South Central Barrow Strait

For Ice Free Period (Aug. 4, 2004 – Sep. 25, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
24	8.34	-1.02	173	196
32	9.53	-2.36	178	201
40	10.25	-3.01	178	200
48	10.21	-3.03	177	198
56	9.74	-2.56	174	200
64	9.26	-2.19	172	201
72	8.87	-1.42	171	202
80	8.56	-1.16	171	199
88	8.27	-0.85	171	203
96	7.98	-0.97	170	202
104	7.99	-0.61	170	204
112	7.77	-0.39	170	204
120	7.79	-0.09	169	204
128	7.61	-0.14	169	203
136	7.36	-0.23	170	205
144	7.28	0.05	169	204
152	7.64	0.12	168	201
160	7.71	0.02	168	203
168	7.81	-0.43	169	203
176	7.72	-0.31	173	205
184	7.81	-0.34	175	206
192	8.20	-0.70	178	207
200	8.18	-0.80	182	210
208	6.73	-1.01	183	213
216	5.75	-0.96	185	223

Table 30 - Tidal Constants for M2 Constituent (continued)

South Central Barrow Strait

For Solid Ice Period (Feb. 12, 2005 – Jul. 1, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
24	6.18	0.35	198	221
32	7.94	-1.36	187	212
40	8.90	-2.09	179	205
48	9.24	-2.32	176	201
56	9.13	-2.32	175	200
64	8.77	-2.44	174	199
72	8.54	-2.31	172	199
80	8.59	-2.24	172	198
88	8.55	-2.38	173	197
96	8.61	-2.22	173	198
104	8.47	-2.11	173	198
112	8.16	-1.86	172	199
120	8.15	-1.66	171	199
128	8.08	-1.54	170	197
136	8.14	-1.31	169	195
144	8.20	-1.33	167	193
152	7.86	-1.01	166	193
160	7.30	-0.49	165	194
168	6.82	-0.03	166	194
176	6.41	0.09	169	197
184	6.18	0.02	172	197
192	6.44	0.12	175	201
200	6.46	0.08	177	205
208	5.58	-0.15	180	209
216	4.70	0.12	184	217

Table 30 - Tidal Constants for M2 Constituent (continued)

Central Barrow Strait

For Ice Free Period (Aug. 3, 2004 – Sep. 24, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	9.63	-1.87	160	182
16	10.01	-2.28	160	180
20	10.29	-2.34	162	182
24	11.17	-2.96	163	183
28	11.43	-3.23	163	187
32	11.15	-2.85	163	189
36	10.96	-2.60	164	190
44	10.79	-2.47	166	191
48	10.62	-2.08	167	191
52	10.46	-2.06	167	192
56	10.29	-2.00	168	194
60	10.11	-1.92	168	195
64	10.16	-1.58	168	196
68	10.00	-1.52	169	196
72	9.96	-1.53	169	196

For Solid Ice Period (Feb. 14, 2005 – Jul. 3, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	3.86	3.09	285	290
16	4.38	3.51	267	278
20	4.62	3.66	194	208
24	6.14	2.07	180	195
28	8.32	0.01	173	192
32	10.38	-1.99	171	191
36	11.61	-3.47	171	190
44	12.28	-4.45	170	190
48	12.57	-4.72	170	190
52	12.59	-4.63	171	191
56	12.57	-4.52	171	192
60	12.56	-4.50	172	192
64	12.50	-4.58	172	192
68	12.45	-4.55	172	192
72	12.43	-4.55	172	192

Table 30 - Tidal Constants for M2 Constituent (continued)

North Side Barrow Strait

For Ice Free Period (Aug. 3, 2004 – Sep. 30, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
9	11.73	-1.41	155	175
13	11.71	-1.09	155	175
17	11.02	-0.88	154	176
21	10.49	-0.45	156	178
25	9.83	0.20	158	179
29	9.44	0.35	159	181
33	9.10	0.42	159	181
37	8.67	0.66	160	182
41	8.40	0.78	161	184
45	8.38	1.06	160	184
49	8.36	1.20	161	184
53	8.37	1.19	162	184
57	8.51	1.15	162	185
61	8.54	1.10	163	185
65	8.64	1.01	163	185
69	8.60	1.16	163	186

For Solid Ice period (Feb. 14, 2005 – Jul. 3, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
9	**Signal to Noise Ratio too low for analysis**			
13	2.46	0.99	216	212
17	6.61	3.17	195	198
21	7.86	1.91	181	189
25	9.17	0.43	173	184
29	10.07	-0.53	168	181
33	10.23	-0.80	166	180
37	10.18	-0.73	164	180
41	10.21	-0.66	163	179
45	10.17	-0.64	163	179
49	10.12	-0.61	163	179
53	10.22	-0.58	162	179
57	10.21	-0.54	163	179
61	10.24	-0.44	162	180
65	10.12	-0.42	163	179
69	9.91	-0.38	162	179

Table 31 - Tidal Constants for O1 Constituent

South Side Barrow Strait

For Ice Free Period (Aug. 4, 2004 – Sep. 25, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10	5.48	-0.10	173	317
14	5.46	-0.07	170	314
18	5.41	0.25	166	312
22	5.47	0.35	167	309
26	5.58	0.41	168	309
30	5.74	0.32	167	308
34	5.91	0.25	167	308
38	5.92	0.13	166	309
42	5.63	-0.10	165	308
46	5.57	0.13	165	308
50	5.59	0.69	164	308
54	5.44	1.09	165	307
58	5.20	1.10	166	307
62	4.98	1.07	164	306
66	4.79	0.86	164	305
70	4.65	0.54	163	301
73	4.81	0.46	163	296
77	4.65	0.62	166	292
81	4.68	0.63	168	290
85	4.68	0.48	169	289
89	4.69	0.64	169	289
93	4.59	0.60	167	286
97	4.57	0.82	168	286
101	4.45	1.01	166	285
105	4.42	1.21	167	286
109	4.36	1.29	169	286
113	4.31	1.21	172	289
117	4.37	1.08	174	291
121	4.43	1.05	174	290
125	4.46	1.17	175	290
129	4.37	1.16	174	289
133	4.49	1.22	174	286
137	4.69	1.27	172	282

Table 31 - Tidal Constants for O1 Constituent (continued)

South Side Barrow Strait

For Solid Ice Period (Feb. 12, 2005 – Jul. 1, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10	2.89	0.67	191	287
14	3.40	0.81	190	295
18	2.97	0.70	184	294
22	3.10	0.65	177	292
26	3.56	0.65	173	292
30	3.81	0.63	169	285
34	3.88	0.49	167	279
38	3.78	0.34	164	275
42	3.76	0.39	161	272
46	3.70	0.40	159	268
50	3.77	0.29	157	265
54	3.84	0.28	157	263
58	3.85	0.29	158	262
62	3.84	0.26	157	261
66	3.93	0.27	156	261
70	4.05	0.31	157	261
73	4.57	0.25	159	262
77	4.54	0.47	158	263
81	4.46	0.47	158	260
85	4.30	0.53	158	260
89	4.31	0.54	159	260
93	4.27	0.64	161	262
97	4.26	0.79	161	262
101	4.25	0.78	161	261
105	4.19	0.81	162	261
109	4.21	0.92	162	262
113	4.19	1.07	163	263
117	4.28	1.16	165	263
121	4.33	1.16	164	263
125	4.42	1.13	164	262
129	4.45	1.07	163	261
133	4.53	1.00	162	260
137	4.47	0.95	165	257

Table 31 - Tidal Constants for O1 Constituent (continued)

South Central Barrow Strait

For Ice Free Period (Aug. 4, 2004 – Sep. 25, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
24	5.37	0.21	176	299
32	5.42	0.30	175	296
40	5.64	0.53	171	295
48	5.66	0.48	168	295
56	5.75	0.16	164	294
64	5.65	0.13	162	294
72	5.72	0.35	161	296
80	5.76	0.06	160	297
88	5.94	-0.05	160	298
96	5.94	0.06	160	300
104	5.69	0.11	158	300
112	5.68	0.04	156	299
120	5.58	0.29	155	304
128	5.66	0.48	156	307
136	5.92	0.31	155	306
144	5.75	0.21	154	306
152	5.94	0.26	154	305
160	6.16	0.13	154	306
168	6.66	-0.22	154	306
176	6.90	-0.18	155	308
184	7.29	-0.30	155	307
192	8.01	-0.37	156	306
200	8.38	-0.92	157	303
208	8.36	-1.17	158	301
216	8.32	-1.53	158	301

Table 31 - Tidal Constants for O1 Constituent (continued)

South Central Barrow Strait

For Solid Ice Period (Feb. 12, 2005 to Jul. 1, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
24	5.74	-0.01	171	301
32	5.96	-0.21	166	298
40	5.64	-0.26	164	300
48	5.53	-0.39	163	301
56	5.35	-0.26	165	302
64	5.13	-0.31	166	301
72	5.16	-0.27	164	304
80	5.04	-0.31	164	303
88	5.06	-0.26	162	303
96	5.10	-0.26	161	302
104	5.02	-0.50	161	303
112	5.09	-0.24	162	302
120	5.09	-0.15	161	303
128	5.13	-0.26	160	304
136	5.25	-0.38	158	304
144	5.39	-0.25	155	304
152	5.57	-0.16	152	305
160	5.75	-0.15	153	306
168	5.84	-0.15	155	304
176	5.93	-0.26	155	304
184	6.42	-0.36	156	305
192	7.21	-0.48	155	305
200	7.56	-0.65	154	303
208	6.82	-0.74	154	304
216	5.89	-0.89	154	304

Table 31 - Tidal Constants for O1 Constituent (continued)

Central Barrow Strait

For Ice Free Period (Aug. 3, 2004 – Sep. 24, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	6.31	-0.39	171	305
16	6.34	-0.54	170	305
20	6.14	-0.59	169	305
24	6.16	-0.29	168	308
28	6.36	-0.23	168	311
32	6.36	-0.31	169	313
36	6.29	-0.52	171	311
44	6.38	-0.57	173	311
48	6.37	-0.46	172	313
52	6.19	-0.46	173	314
56	6.03	-0.53	173	314
60	5.97	-0.71	172	314
64	6.01	-0.75	170	314
68	6.00	-0.68	171	314
72	5.96	-0.71	171	314

For Solid Ice Period (Feb. 14, 2005 – Jul. 3, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	4.86	0.20	179	303
16	5.79	-0.32	180	304
20	6.24	-0.70	175	303
24	6.25	-0.96	169	301
28	6.12	-0.96	165	302
32	5.88	-0.88	166	302
36	5.78	-0.93	166	302
44	5.64	-1.00	167	305
48	5.63	-1.02	167	305
52	5.64	-1.06	166	306
56	5.66	-1.03	166	307
60	5.76	-1.09	167	307
64	5.84	-1.10	168	307
68	5.82	-1.14	168	306
72	5.74	-1.19	168	307

Table 31 - Tidal Constants for O1 Constituent (continued)

North Side Barrow Strait

For Ice Free Period (Aug. 3, 2004 – Sep. 30, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
9	4.34	0.54	172	279
13	4.21	0.55	175	279
17	4.15	0.59	176	283
21	4.35	0.58	174	287
25	4.86	0.59	174	287
29	4.93	0.43	172	286
33	4.64	0.20	172	281
37	4.51	0.13	172	277
41	4.36	0.06	173	273
45	4.29	0.18	171	272
49	4.24	0.31	170	271
53	4.30	0.28	171	272
57	4.27	0.35	172	271
61	4.22	0.38	173	271
65	4.13	0.46	175	270
69	4.10	0.48	175	270

For Solid Ice Period (Feb. 14, 2005 – Jul. 3, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
9	**Signal to Noise Ratio too low for analysis**			
13	1.50	0.01	192	230
17	3.49	0.86	175	242
21	3.87	0.43	166	242
25	4.13	0.27	163	243
29	4.23	0.06	160	244
33	4.41	-0.11	159	248
37	4.39	-0.17	158	250
41	4.35	-0.09	158	252
45	4.55	-0.03	158	255
49	4.77	-0.14	159	255
53	4.90	-0.13	158	255
57	4.90	-0.13	157	255
61	4.98	-0.15	156	256
65	5.02	-0.12	156	257
69	5.00	-0.08	157	258

Table 32 - Tidal Constants for P1 Constituent

South Side Barrow Strait

For Ice Free Period (Aug. 4, 2004 – Sep. 25, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10	2.77	0.02	159	173
14	2.61	-0.79	142	187
18	3.24	-1.16	110	227
22	3.22	-0.73	120	244
26	2.68	-0.65	134	252
30	2.52	-0.05	154	251
34	2.68	-0.18	161	249
38	3.12	-0.15	165	236
42	3.56	0.30	161	231
46	3.39	1.11	146	229
50	3.11	1.52	133	226
54	2.57	1.47	127	225
58	1.87	0.69	154	257
62	2.04	-0.31	162	283
66	2.09	-0.53	155	296
70	2.13	-0.38	151	295
73	2.48	-0.65	167	267
77	1.88	-1.00	155	274
81	2.45	-1.23	164	259
85	2.55	-0.88	154	266
89	2.88	-0.47	151	260
93	1.94	-0.31	143	258
97	1.21	0.10	147	261
101	1.24	0.45	202	275
105	1.80	0.50	227	285
109	1.79	0.73	233	288
113	1.58	0.80	260	308
117	1.29	0.85	261	297
121	1.44	0.72	261	295
125	1.50	0.69	253	290
129	1.62	0.84	246	271
133	1.44	1.11	273	280
137	1.76	1.27	318	309

Table 32 - Tidal Constants for P1 Constituent (continued)

South Side Barrow Strait

For Solid Ice Period (Feb. 12, 2005 – Jul. 1, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10	3.73	0.19	190	26
14	3.14	0.28	183	20
18	2.43	0.25	167	359
22	2.48	0.08	162	358
26	2.66	0.01	164	348
30	2.62	0.17	166	337
34	2.52	0.20	167	331
38	2.64	0.23	163	323
42	2.79	0.28	164	318
46	2.75	0.24	168	321
50	2.76	0.24	171	325
54	2.69	0.36	172	327
58	2.58	0.46	170	324
62	2.51	0.62	168	322
66	2.59	0.79	160	314
70	2.79	0.82	154	309
73	2.60	0.93	152	308
77	2.85	0.78	149	304
81	2.93	0.77	152	304
85	3.11	0.84	153	308
89	3.07	0.91	154	309
93	3.04	0.93	154	310
97	3.11	1.00	155	310
101	3.24	1.06	156	310
105	3.41	1.10	157	310
109	3.50	1.12	157	310
113	3.60	1.10	160	310
117	3.65	0.96	159	309
121	3.65	1.02	160	309
125	3.72	1.08	159	307
129	3.73	1.01	160	306
133	3.85	0.95	163	305
137	3.90	0.80	167	301

Table 32 - Tidal Constants for P1 Constituent (continued)

South Central Barrow Strait

For Ice Free Period (Aug. 4, 2004 – Sep. 25, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
24	4.17	-1.35	152	339
32	4.50	-0.52	138	335
40	4.24	-0.86	137	350
48	4.18	-0.96	138	353
56	4.59	-1.40	158	351
64	4.73	-1.25	163	348
72	3.98	-1.49	159	352
80	4.11	-0.84	168	351
88	3.99	-0.77	175	4
96	4.35	-1.20	172	9
104	4.00	-0.65	170	18
112	3.81	-0.98	170	15
120	3.55	-0.31	171	12
128	3.54	-0.51	168	15
136	3.61	-1.05	167	14
144	3.78	-0.85	163	21
152	3.14	-1.03	158	27
160	2.93	-0.82	175	16
168	3.15	-0.77	178	10
176	3.22	-0.84	185	14
184	3.00	-0.68	180	25
192	3.23	-0.54	168	22
200	4.37	-0.80	155	4
208	3.60	-0.89	158	358
216	2.16	-1.26	125	6

Table 32 - Tidal Constants for P1 Constituent (continued)

South Central Barrow Strait

For Solid Ice Period (Feb. 12, 2005 to Jul. 1, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
24	3.86	-0.11	170	356
32	3.67	-0.12	172	351
40	3.53	-0.12	169	349
48	3.30	-0.14	164	348
56	3.12	-0.29	166	348
64	3.01	-0.26	161	350
72	2.92	-0.29	163	349
80	3.03	-0.15	167	351
88	2.95	-0.23	166	351
96	2.93	-0.24	167	352
104	3.02	-0.33	166	350
112	3.07	-0.25	163	353
120	3.30	-0.47	163	353
128	3.46	-0.53	163	353
136	3.52	-0.38	160	354
144	3.64	-0.46	160	358
152	3.64	-0.43	162	3
160	3.71	-0.20	161	6
168	3.56	-0.22	161	8
176	3.15	-0.14	164	2
184	2.85	-0.20	163	6
192	3.15	-0.15	160	8
200	3.35	-0.44	156	11
208	2.51	-0.36	154	6
216	1.74	-0.29	161	342

Table 32 - Tidal Constants for P1 Constituent (continued)

Central Barrow Strait

For Ice Free Period (Aug. 3, 2004 – Sep. 24, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	4.44	-0.59	158	0
16	5.41	-1.46	157	3
20	5.02	-1.38	154	12
24	4.58	-0.83	150	19
28	3.62	-1.20	145	14
32	3.34	-1.26	153	5
36	3.53	-0.62	162	0
44	4.52	-0.80	161	16
48	4.76	-0.80	163	16
52	4.52	-0.79	160	13
56	4.49	-1.10	157	10
60	4.86	-1.19	158	9
64	4.62	-1.05	156	11
68	4.57	-0.97	158	7
72	4.66	-0.78	160	4

For Solid Ice Period (Feb. 14, 2005 – Jul. 3, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	3.92	-0.51	178	358
16	4.35	-0.58	176	355
20	4.53	-0.52	173	355
24	4.58	-0.59	172	353
28	4.80	-0.88	170	350
32	4.63	-0.96	167	349
36	4.48	-0.86	168	350
44	4.32	-0.86	174	356
48	4.39	-0.97	172	358
52	4.30	-0.98	172	358
56	4.22	-0.91	170	358
60	4.16	-0.91	171	358
64	4.20	-0.95	170	359
68	4.16	-0.95	171	360
72	4.13	-1.06	171	359

Table 32 - Tidal Constants for P1 Constituent (continued)

North Side Barrow Strait

For Ice Free Period (Aug. 3, 2004 – Sep. 30, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
9	2.76	1.50	142	298
13	2.24	2.04	130	297
17	2.68	1.72	144	322
21	3.15	1.56	143	311
25	3.64	1.23	148	303
29	4.28	0.61	156	299
33	3.77	-0.13	168	295
37	3.58	0.13	169	290
41	4.25	0.14	172	283
45	4.44	0.04	170	279
49	4.67	0.29	165	278
53	4.76	0.61	160	278
57	4.65	0.72	156	278
61	4.70	0.50	156	279
65	4.73	0.21	156	282
69	4.02	0.15	155	284

For Solid Ice Period (Feb. 14, 2005 – Jul. 3, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
9	**Signal to Noise Ratio too low for analysis**			
13	1.14	0.18	186	286
17	2.11	-0.02	195	308
21	2.38	-0.19	188	303
25	2.46	-0.30	180	305
29	2.53	-0.28	176	312
33	2.63	-0.20	175	317
37	2.75	-0.20	173	317
41	2.73	0.00	170	318
45	2.78	0.27	170	318
49	3.00	0.36	168	318
53	3.14	0.33	168	316
57	3.34	0.37	168	314
61	3.48	0.47	165	312
65	3.51	0.49	162	310
69	3.56	0.49	162	310

Table 33 - Tidal Constants for S2 Constituent

South Side Barrow Strait

For Ice Free Period (Aug. 4, 2004 – Sep. 25, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10	3.27	-0.25	188	268
14	3.13	-0.11	184	264
18	2.74	-0.09	181	261
22	3.05	-0.01	173	255
26	3.46	0.00	168	251
30	3.66	-0.04	164	246
34	4.00	0.02	154	239
38	4.19	0.14	148	241
42	4.38	-0.01	148	241
46	4.62	0.02	147	238
50	4.84	-0.16	147	238
54	4.88	-0.14	149	240
58	5.07	-0.07	150	241
62	5.26	0.00	149	243
66	5.34	0.15	151	245
70	5.15	0.27	153	248
73	5.17	0.83	156	249
77	4.95	0.90	156	251
81	4.60	0.95	157	253
85	4.58	1.17	158	254
89	4.86	1.20	160	253
93	5.00	0.96	162	252
97	4.98	0.66	162	254
101	4.79	0.46	161	252
105	4.57	0.41	158	251
109	4.45	0.46	159	251
113	4.48	0.66	159	250
117	4.43	0.56	162	252
121	4.55	0.21	164	254
125	4.81	0.00	165	256
129	4.98	-0.40	166	257
133	5.16	-0.73	166	258
137	5.20	-0.96	169	259

Table 33 - Tidal Constants for S2 Constituent (continued)

South Side Barrow Strait

For Solid ice Period (Feb. 12, 2005 – Jul. 1, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
10	1.44	0.69	209	297
14	1.53	0.93	216	295
18	1.83	1.15	189	267
22	2.06	0.89	180	256
26	2.74	0.13	172	247
30	3.40	-0.45	174	248
34	4.12	-0.88	177	248
38	4.35	-1.07	177	247
42	4.26	-1.07	173	246
46	4.19	-1.14	168	243
50	4.22	-1.17	166	242
54	4.18	-1.06	166	239
58	3.94	-0.98	163	239
62	3.86	-0.92	163	238
66	3.92	-0.90	164	236
70	3.90	-0.94	164	235
73	3.79	-0.89	162	237
77	3.71	-0.67	163	236
81	3.77	-0.60	164	233
85	3.71	-0.52	166	235
89	3.62	-0.55	167	236
93	3.48	-0.63	169	235
97	3.52	-0.64	170	235
101	3.60	-0.70	171	236
105	3.58	-0.69	172	235
109	3.49	-0.68	174	235
113	3.37	-0.64	175	236
117	3.26	-0.52	176	238
121	3.19	-0.48	180	240
125	3.14	-0.54	183	243
129	3.17	-0.52	184	248
133	3.33	-0.43	188	252
137	3.27	-0.17	193	254

Table 33 - Tidal Constants for S2 Constituent (continued)

South Central Barrow Strait

For Ice Free Period (Aug. 4, 2004 – Sep. 25, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
24	5.40	-1.54	160	259
32	4.75	-0.98	163	262
40	4.26	-0.44	168	265
48	4.26	-0.83	174	269
56	4.73	-1.35	175	269
64	4.87	-1.63	176	269
72	4.75	-1.43	180	267
80	4.46	-1.22	181	266
88	4.29	-1.01	181	264
96	4.20	-1.04	181	266
104	4.18	-0.86	182	268
112	3.86	-1.02	185	270
120	3.66	-1.02	190	264
128	3.71	-0.95	193	266
136	3.60	-0.72	195	266
144	3.21	-0.38	197	272
152	2.84	-0.15	192	265
160	2.41	-0.01	191	261
168	1.93	0.48	193	256
176	1.65	0.50	184	244
184	1.39	0.43	182	235
192	1.70	0.07	188	243
200	1.89	-0.20	193	260
208	2.09	-0.73	187	271
216	2.49	-1.36	195	276

Table 33 - Tidal Constants for S2 Constituent (continued)

South Central Barrow Strait

For Solid Ice Period (Feb. 12, 2005 – Jul. 1, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
24	1.73	0.98	181	243
32	2.69	0.09	183	250
40	3.23	-0.41	183	251
48	3.39	-0.71	180	250
56	3.41	-0.75	181	248
64	3.36	-0.82	181	249
72	3.39	-0.81	179	250
80	3.28	-0.82	180	248
88	3.32	-0.96	177	250
96	3.27	-0.90	174	251
104	3.35	-0.84	173	250
112	3.47	-0.80	169	251
120	3.62	-1.00	168	247
128	3.74	-1.24	168	245
136	4.01	-1.38	166	242
144	4.25	-1.31	164	242
152	4.45	-1.47	163	242
160	4.39	-1.53	164	241
168	4.18	-1.44	167	244
176	3.89	-1.25	170	249
184	3.76	-0.94	170	255
192	3.79	-0.53	172	255
200	3.49	-0.05	169	258
208	2.53	0.25	170	256
216	1.83	0.45	162	254

Table 33 - Tidal Constants for S2 Constituent (continued)

Central Barrow Strait

For Ice Free Period (Aug. 3, 2004 – Sep. 24, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	7.48	-4.04	165	249
16	7.02	-3.52	169	251
20	5.86	-2.43	170	252
24	5.62	-1.89	172	254
28	5.51	-1.89	172	256
32	5.31	-1.86	170	255
36	5.47	-1.88	172	257
44	5.73	-1.93	177	259
48	5.49	-1.73	177	262
52	5.15	-1.43	176	265
56	4.95	-1.17	178	265
60	4.64	-1.04	178	264
64	4.52	-0.90	176	264
68	4.42	-0.71	176	263
72	4.32	-0.61	173	263

For Solid Ice Period (Feb. 14, 2005 – Jul. 3, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
12	2.13	0.58	109	159
16	2.56	0.76	115	167
20	2.55	0.85	129	184
24	3.02	0.38	146	201
28	3.58	-0.28	159	214
32	4.39	-1.13	168	226
36	5.16	-1.89	176	235
44	5.76	-2.35	184	239
48	5.49	-2.02	184	237
52	5.29	-1.88	183	237
56	5.21	-1.80	183	237
60	5.22	-1.92	184	238
64	5.22	-1.88	184	238
68	5.21	-1.84	183	239
72	5.16	-1.86	183	239

Table 33 - Tidal Constants for S2 Constituent (continued)

North Side Barrow Strait

For Ice Free Period (Aug. 3, 2004 – Sep. 30, 2004):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
9	4.90	-0.79	173	252
13	5.24	-1.14	172	254
17	4.82	-0.79	170	253
21	4.74	-0.50	170	254
25	4.23	-0.26	173	254
29	3.88	0.04	173	250
33	3.65	0.18	173	250
37	3.74	0.36	170	248
41	3.58	0.18	166	243
45	3.70	0.11	163	237
49	3.83	0.01	162	233
53	3.95	0.01	161	231
57	3.91	0.08	161	231
61	3.96	0.19	160	231
65	3.92	0.17	158	231
69	3.90	0.20	158	232

For Solid Ice Period (Feb. 14, 2005 – Jul. 3, 2005):

Depth (m)	Major Amplitude (cm/s)	Minor Amplitude (cm/s)	Orientation (degrees cc from East)	Greenwich Phase (degrees)
9	**Signal to Noise Ratio too low for analysis**			
13	0.83	0.62	250	284
17	2.26	1.76	205	252
21	2.73	1.29	177	231
25	3.02	0.94	173	229
29	3.14	0.68	171	229
33	3.32	0.45	172	231
37	3.56	0.44	171	230
41	3.73	0.25	171	232
45	3.80	0.13	170	230
49	3.85	0.16	168	228
53	3.85	0.24	165	227
57	3.82	0.28	164	224
61	3.88	0.27	162	225
65	3.97	0.19	161	224
69	3.96	0.14	161	222